



Monitoring Visitor Use in the Southwest Alaska Network using Commercial Use Authorization (CUA) Reports

Protocol Narrative Version 1.0

Natural Resource Report NPS/SWAN/NRR—2018/1693



ON THE COVER

Visitors bear watching at Brooks Falls, Katmai National Park and Preserve
NPS

Monitoring Visitor Use in the Southwest Alaska Network using Commercial Use Authorization (CUA) Reports

Protocol Narrative Version 1.0

Natural Resource Report NPS/SWAN/NRR—2018/1693

Tim Shepherd, Russell Frith

National Park Service
Southwest Alaska Inventory & Monitoring Network
240 West 5th Avenue
Anchorage, AK 99501

August 2018

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate comprehensive information and analysis about natural resources and related topics concerning lands managed by the National Park Service. The series supports the advancement of science, informed decision-making, and the achievement of the National Park Service mission. The series also provides a forum for presenting more lengthy results that may not be accepted by publications with page limitations.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available in digital format from [Southwest Alaska Inventory & Monitoring Network's website](#) and the [Natural Resource Publications Management website](#). If you have difficulty accessing information in this publication, particularly if using assistive technology, please email irma@nps.gov.

Please cite this publication as:

Shepherd, T., and R. Frith. 2018. Monitoring visitor use in the Southwest Alaska Network using commercial use authorization (CUA) reports: Protocol narrative version 1.0. Natural Resource Report NPS/SWAN/NRR—2018/1693. National Park Service, Fort Collins, Colorado.

Contents

	Page
Figures.....	v
Tables.....	v
Abstract.....	vi
1. Background and Objectives	1
1.1 Background and history.....	1
1.2 Rationale for Monitoring.....	2
1.3 Measurable Objectives	3
2. Sampling Design.....	5
2.1 Rationale for selecting this sampling design over others	5
2.2 Site Selection.....	5
2.3 Sampling frequency.....	9
2.4 Level of change that can be detected.....	9
3. Methods.....	11
3.1 Data Acquisition.....	11
3.2 Processing Data	11
3.3 Calculated Values – Visitor Use Days	12
3.4 Preserving Data	13
3.5 Accessing Data	13
4. Data Handling, Analysis and Reporting	15
4.1 Metadata	15
4.2 Overview of Database Design	15
4.3 Data Entry, Verification, and Editing.....	16
4.4 Data Analysis.....	18
4.5 Reporting	18
4.6 Data Archiving	19
5. Personnel Requirements and Training	21

Contents (continued)

	Page
5.1 Roles and Responsibilities.....	21
5.2 Qualifications	22
5.3 Training	22
6. Operational Requirements	23
6.1 Annual workloads.....	23
6.2 Annual budget	23
6.3 Infrastructure	24
6.4 Network Information Technology Functions	24
7. Literature Cited	27
Appendix A.....	29
Appendix B	33

Figures

	Page
Figure 1. Southwest Alaska Network (SWAN) park units are located on the Alaska and Kenai Peninsulas.	1
Figure 2. Visitor use monitoring areas in Lake Clark National Park & Preserve.	6
Figure 3. Visitor use monitoring areas in Katmai National Park & Preserve and Alagnak Wild River.	7
Figure 4. Visitor use monitoring areas in Aniakchak National Monument & Preserve.	8
Figure 5. States of the CUA Data Life Cycle.	11
Figure 6. CUA Data Workflow.	17
Figure 7. Venn diagram showing DevOps as the intersection of software development, operations, and quality assurance.	25
Figure 8. Stages in SWAN information technology CUA development and operations toolchain.	26
Figure A-1. A screen capture showing the Lake Clark National Park and Preserve’s activity report.	29

Tables

	Page
Table 1. An example of a pivot table to review the visitor use days by company and year	17
Table 2. Annual schedule of activities.	23
Table 3. Estimated annual operating costs (based on FY2018 dollars) for implementing the SWAN visitor use protocol. Personnel costs include salary and benefits.	23

Abstract

This protocol describes methods for collecting visitor use data in the Southwest Alaska Network. SWAN's Monitoring Plan (Bennet et. al. 2006) identified visitor use of parks as an important agent of change in the parks' ecosystems. With large parks and few well-defined gateways, the Commercial Use Authorization data collected by the park provides a low cost means of counting visitor use in the parks. This census data can be used to look at how visitation to the parks and locations within the parks are changing over time. In addition, they provide parks with enough data to allocate NPS staff to areas of high use.

1. Background and Objectives

1.1 Background and history

This protocol narrative and the accompanying Standard Operating Procedures (SOPs 1-4; Shepherd and Frith 2018a, b, c, d) outline the methods used to monitor visitor use within the Southwest Alaska Network (SWAN). SWAN is one of four networks established within Alaska as part of the National Park Service's (NPS) Inventory and Monitoring (I&M) Program. It consists of five units of the NPS (Figure 1): Alagnak Wild River (ALAG), Aniakchak National Monument and Preserve (ANIA), Katmai National Park and Preserve (KATM), Kenai Fjords National Park (KEFJ), and Lake Clark National Park and Preserve (LACL). Collectively, these units comprise 3.8 million hectares (9.4 million acres) and extend over 650 km (400 miles) of the Alaska and Kenai Peninsulas.

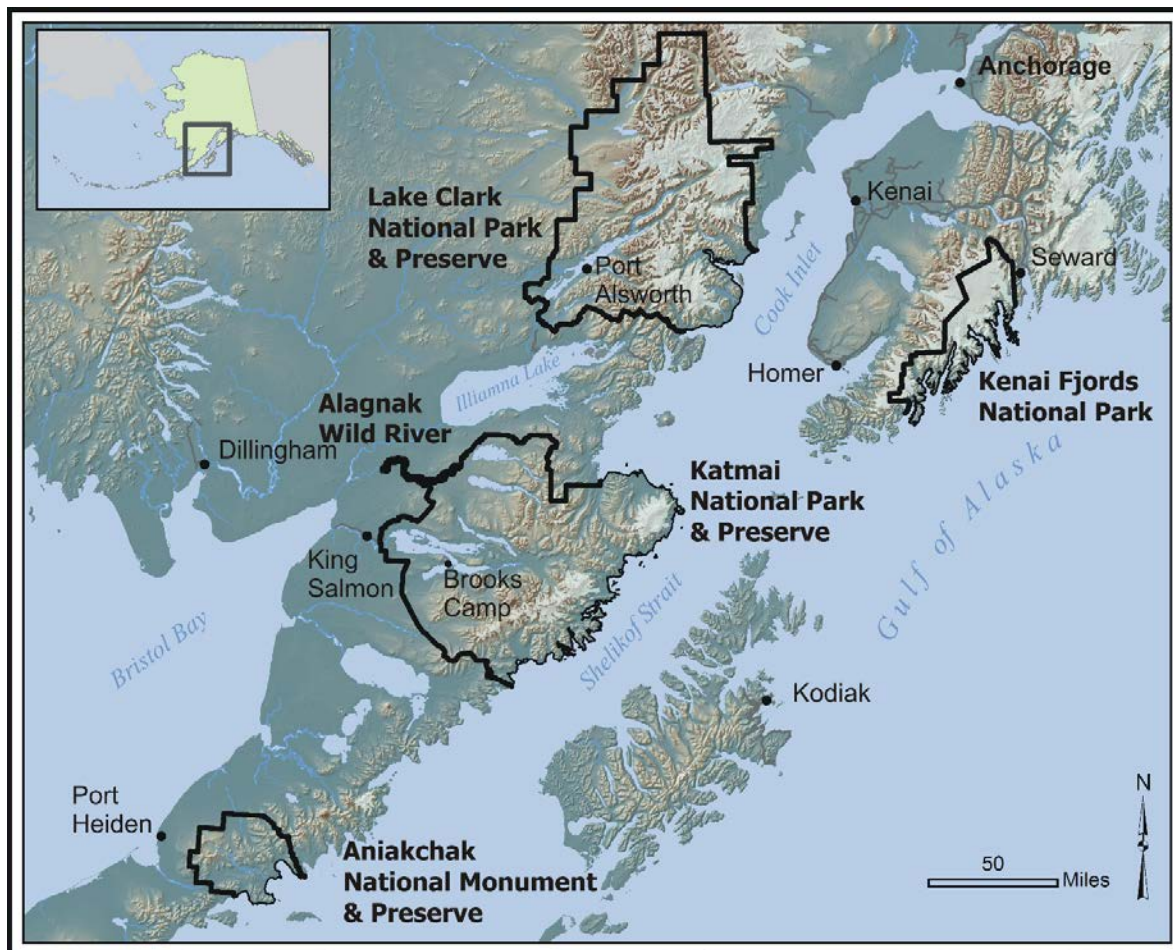


Figure 1. Southwest Alaska Network (SWAN) park units are located on the Alaska and Kenai Peninsulas.

The Vital Signs Monitoring Program was established in 2001 to assess the status of and trends in selected resources representing the overall health of the parks. These resources are considered vulnerable to alteration by stressors, or they are of special value to humans. During initial scoping meetings and monitoring development workshops, scientists from universities and state and federal

agencies identified visitor use (recreational use) as a human activity that warranted long-term monitoring in the SWAN parks (Bennett et al. 2006).

Early studies in support of protocol development for visitor use monitoring in SWAN were completed by Monz (2005) and Fay (2007). The Monz (2005) report focused on visitor counts and impact monitoring and included scoping meetings with park managers to determine park management concerns and priorities. The report outlined sampling requirements for a robust statistical estimate of visitor numbers and outlined approaches for monitoring visitor impacts through the use of permanent plots in high use areas. A review of the Monz (2005) report by park and network staff determined that the resources required to measure site impacts and independently count visitors in the parks was more than the parks could commit to. The parks do not collect entrance fees, nor do they require visitor registration or permits, and are unlikely to do so in the near future. With few well-defined gateways, large management areas, and small staffs, direct methods of estimating park visitation through time (e.g., direct observations by NPS staff alone) were not considered practical (Bennett et al. 2006).

The report by Fay (2007) examined past visitor use volume and patterns in the parks with the goal of developing a system to both monitor visitor use over time and to evaluate visitor impacts. A key assumption of the design was that changes in annual visitor counts would not result from changes in measurement practices, intensity, or frequency. The author interviewed park staff and management and examined Commercial Use Authorization (CUA) data that the parks had regarding visitor counts in the parks. A database for the CUA data was developed along with a standardized reporting form for the CUA operators. Fay (2007) found discrepancies in visitor counts between ranger field reports submitted by the parks and the CUA activity reports. In LACL, ranger field reports recorded consistently higher visitor numbers than CUA activity reports, presumably due to the number of visitors that were in the park independently, without a guide or commercial operator drop-off. In KATM, visitation numbers at the time of the Fay (2007) report had not been recorded consistently enough to be used for analysis. Concessionaire data were not addressed in either the Monz (2005) or Fay (2007) studies, and were not included by Fay (2007) during the initial database development.

1.2 Rationale for Monitoring

Human activities are identified as an important agent of change in SWAN ecosystems (Bennett et al. 2006). Recreational use by visitors and guides presents two resource protection issues in the parks: (i) direct impact to physical resources, plant and animals from actions such as vehicle use and camping (e.g., Smith 2002; Smith and Johnson 2004; French 2007; Deur 2008; Fortin et al. 2016), and (ii) indirect impacts such as disturbance or displacement of wildlife from actions such as aircraft over-flights (Smith 2002; Smith and Johnson 2004; Bennett et al. 2006; Fay 2007). Because of the impacts that human recreation can have on the environment, visitor use was ranked as a Tier 1 vital sign for SWAN (Bennett et al. 2006). Management also placed importance on knowing when and where people were visiting the park. Visitor use counts provided by CUA activity reports provide a low-cost means of estimating the potential impacts to park resources. In addition, they provide parks with enough data to allocate NPS staff to areas of high use.

1.3 Measurable Objectives

Measurable objectives for monitoring visitor use in SWAN are as follows:

- Document the number of visitors in parks monthly and/or annually, as recorded by CUA activity reports.
- Document visitor use days monthly and/or annually in specified areas of use (visitor use monitoring areas), as recorded by CUA activity reports. Visitor use monitoring areas are synonymous with 'locations' in the activity reports and database.
- Document variation in annual visitation park-wide (visitor counts consisting of clients and/or guides) or by visitor use monitoring area (visitor use days), as recorded by CUA activity reports.

2. Sampling Design

2.1 Rationale for selecting this sampling design over others

Due to logistical and budget constraints, SWAN and network parks harvest visitor use data from CUA activity reports, rather than collect on-the-ground visitor counts at specific locations. These data provide a census, rather than a sample, of visitors who access the parks using CUAs. Established CUA reporting requirements provide a consistent, long-term record of visitor use days (the total number of people (clients and guides) multiplied by the number of days at a location) and locations visited. An example CUA reporting form is included in Appendix A. This monitoring approach was recommended by Fay (2007) as a low-cost and relatively simple means of assessing visitation through commercial operations, which comprises the majority of visitation in our parks (e.g., 85% or greater in KATM; Cook 2015). Our decision to use this approach resulted from multiple meetings with park staff and researchers who determined CUA activity reports to be the most efficient and effective method to assess visitation (Fay 2007).

2.2 Site Selection

The monitoring of visitors in ALAG, ANIA, KATM, and LACL is designed to address the timing and location of visitors as reported by CUA operators. Although a part of SWAN, KEFJ has not historically collected this level of data from CUA operators. This protocol divides parks into visitor use monitoring areas based on watershed boundaries and management needs, as defined by the parks in 2011-12 (Figures 2-4). These monitoring areas were created in order to standardize the location names used by CUA operators, and to provide a means for consistently summarizing use in different areas of the parks. In a situation in which multiple operators are working with the same visitor group, the operators are responsible for determining who will report the clients. Data collection by visitor use monitoring area includes the following metrics:

- Number of clients and guides by trip (party/group size).
- Number of visitor use days (clients plus guides multiplied by day(s) at location) by location.
- Visitor activities by location.
- Number of guided or unguided trips.

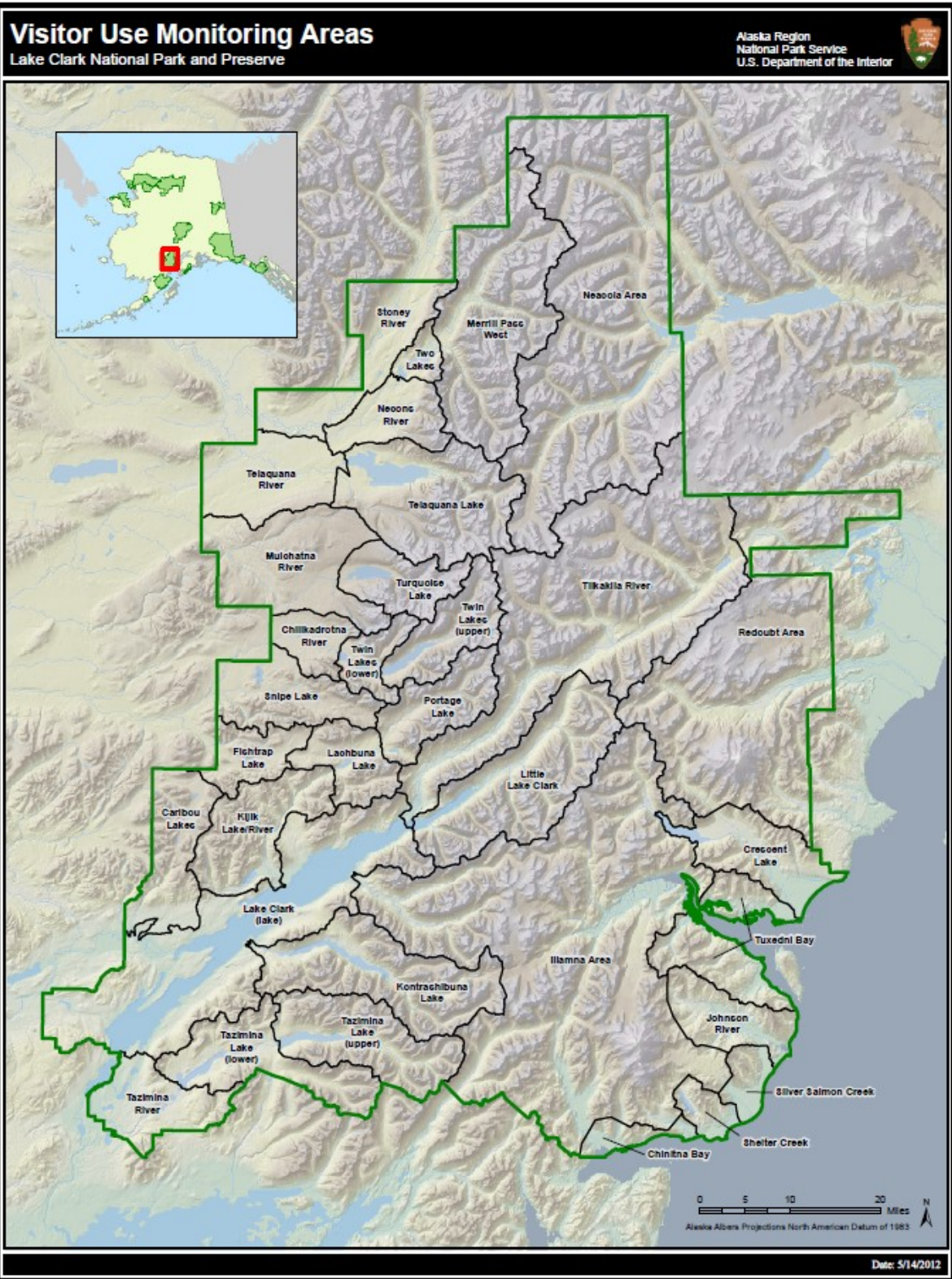


Figure 2. Visitor use monitoring areas in Lake Clark National Park & Preserve.



Figure 3. Visitor use monitoring areas in Katmai National Park & Preserve and Alagnak Wild River.

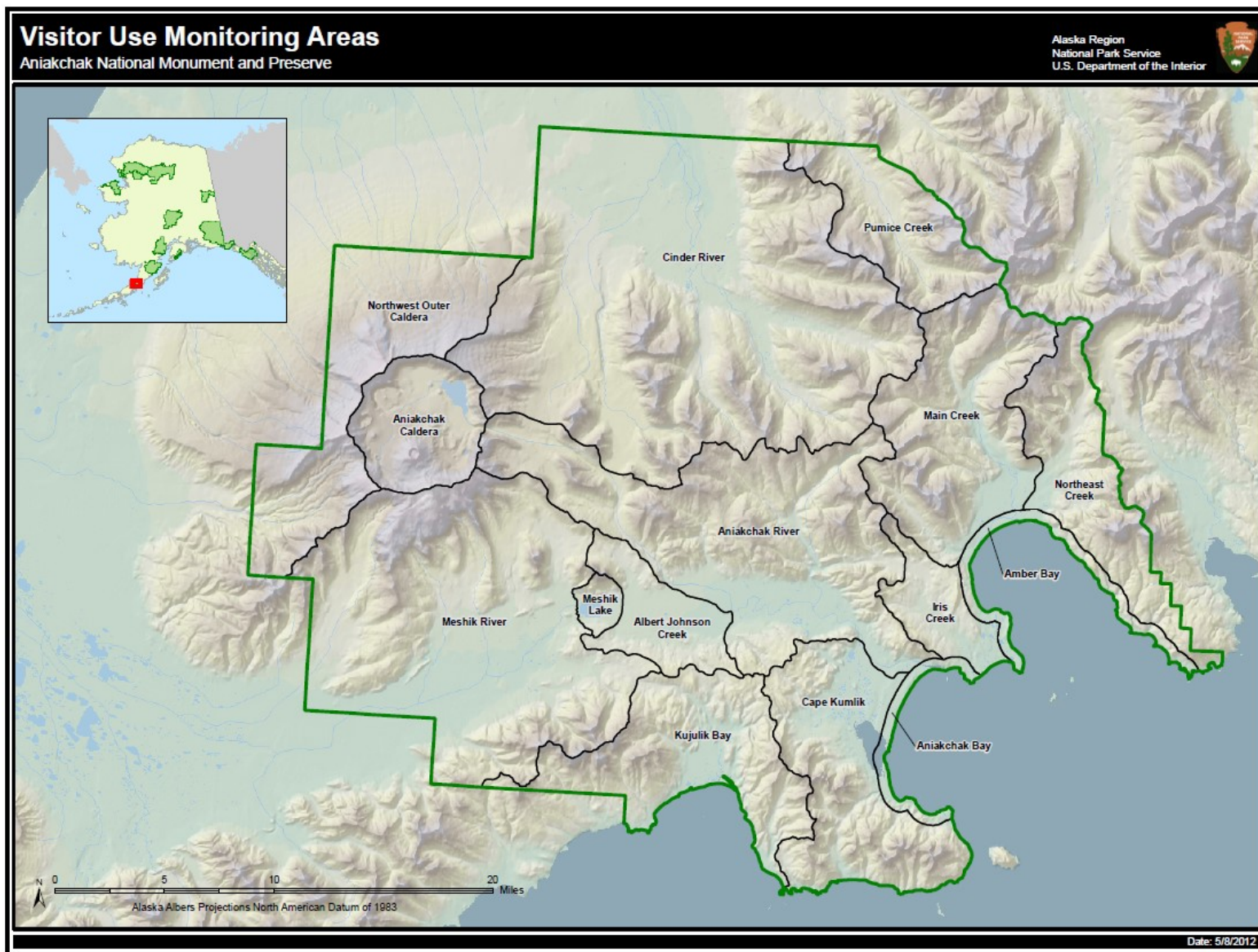


Figure 4. Visitor use monitoring areas in Aniakchak National Monument & Preserve.

2.3 Sampling frequency

Data are harvested annually from CUA activity reports. The reports are submitted to the parks by the deadline defined by each park's permit requirements, usually late fall (November-December).

2.4 Level of change that can be detected

Our monitoring approach utilizes census data and lacks a probabilistic sampling design, and as a result we are unable to use the CUA data to make statistical inferences about overall park visitation. Instead, we summarize CUA data by visitor use monitoring area and year for qualitative estimates of change in visitor use days through time in the parks. Our monitoring objectives reflect these limitations and seek only to summarize annual variation in visitation, rather than to document statistically significant trends.

3. Methods

Collection of visitor use data flows across different groups in the Alaska Region but all contributions conform to a generalized data life cycle pattern that addresses key organizational objectives. The general pattern of a data life cycle is illustrated below (Figure 5).

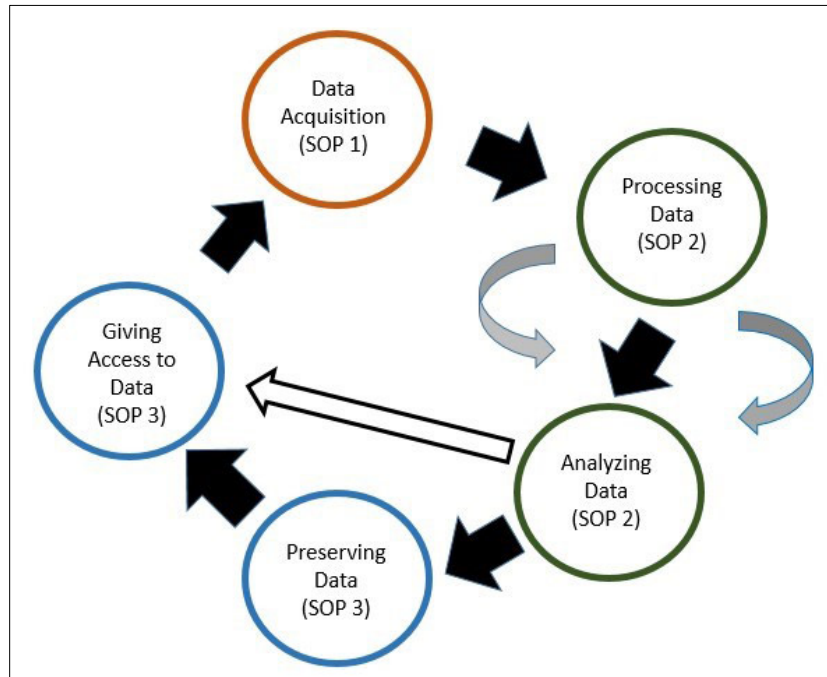


Figure 5. States of the CUA Data Life Cycle

Each node depicted in the data life cycle state diagram consists of a sequence of task elements which are described in the passages that follow. Specific details for each node are elaborated further in the Standard Operating Procedures (SOPs).

3.1 Data Acquisition

Visitor use data are harvested from CUA activity reports and are submitted by the commercial operators to the park, according to the permit requirements for each park.

3.2 Processing Data

When activity reports are submitted to a park, the park's CUA Manager will verify that all fields have been filled in correctly. When possible, the CUA Manager will fill in missing information if it is available, or he/she will request the missing data from the commercial operator. In particular, the Visitor Use Days (VUD) value (total number of people multiplied by number of days at a location) should be double-checked and confirmed as correct (see Section 3.3, below).

Once an activity report has been reviewed, and corrected if necessary, the data are ready for entry into the database. The Excel file that comprises the activity report is first converted to comma-separated values (CSV) format. The CSV file is then loaded through a web application that parses the

data and loads it into the database. During that process, validation checks are run on the data: if a check fails, the data will not be entered and the error will need to be found and corrected to allow the data to import successfully into the database. If the upload is successful, the imported data will require a second review to ensure that they came through correctly. Sometimes an uncontrolled error occurs during the importing process and not all of the data are imported into the database.

After all of the activity reports for a park are entered for the year, a summation of VUDs across years is created. These data are examined for missing reports from commercial operators or for large changes in numbers compared to the previous year, which could indicate that a report was mistakenly entered twice, or an uncaptured error occurred that allowed some but not all of the data to be loaded into the database during the importing process (see Section 4.3, Data Entry, Verification, and Editing).

3.3 Calculated Values – Visitor Use Days

The VUD is a nominal value used to measure visitation to visitor use monitoring areas (locations) within the parks. This number is calculated as the total number of people (clients plus guides) multiplied by the number of days at a given location. Days are recorded as whole numbers rather than as hours and serve as the unit of time spent by people at a particular location. The implication of this rule is that if two or more locations are visited on the same day, then the VUDs for those locations are recorded as the same value (e.g., if there were 4 people in the group and they visited 2 locations in the same day, Locations 1 and 2 would both show 4 VUD for that group). In most cases, trips into the parks are one-day events. If the trip is multiple days at a single location, the VUD is calculated from the number of people multiplied by number of days at that location. In the two previous examples, park personnel can correct any errors in the VUD value. However, if a multi-day, multi-location trip is recorded and the VUD value seems unlikely or wrong, the commercial operator will need to be contacted for clarification of the VUD values.

The CUA count values have five attributes that can result in underestimates of the total number of visitors and VUD to the parks. These are:

1. *The CUA data only capture visitors who are using a commercial operator to enter the park.* The data acquired does not capture persons visiting parks using their own means of personal transport, such as boats and aircraft, nor is there data on park visitation from people who live near or within the park. However, due to the remoteness of SWAN parks, the majority of park visitors use commercial services to access those parks. It has been estimated that 85% of park visitors are using commercial services in KATM (Cook 2015) and likely the other SWAN parks has a similar or greater use of commercial services to access the park.
2. *Unguided overnight drop-offs and pick-ups in a park are reported as one-day trips.* Since commercial operators only report the time that they spend with clients, then an unguided overnight drop-off and pick-up in a park is reported as a one day trip (*i.e.*, the pick-up and drop-off are each recorded as separate one day trips), even if the clients spend multiple days to week(s) in the park.

3. *If a lodge or other operation is located on a private inholding in a park, clients of the lodge can explore the park on their own, without the assistance of a CUA, their visit/trip to the park will not be recorded. Likewise, individuals who access the park from a private inholding would fall into this category (see also (1), above).*
4. *Visits that occur below mean high tide, including drop-offs and pick-ups, are not reported by commercial operators. Coastal boundaries of the parks extend only to the mean high tide line, and if a commercial operator stays below the high tide line, they remain outside of the park and do not need to report the trip. Likewise, if an operator drops clients off on an unguided trip below the mean high tide line, the trip itself does not need to be reported, even if the clients spend multiple days, unguided, in the park.*
5. *CUA operators self-report and fees are based on per client, per day rates. We do not have data from the field that could be used to validate visitor use counts from the CUA activity reports, and thus underreporting of the number of trips and/or clients a CUA operator brings into a park remains a potential source of error that we cannot account for. In addition, the potential for under- or over-reporting exists if multiple CUA operators work with a single set of visitors (e.g., an air tax operator that drops off a guided hiking group that operates under a separate CUA). In this case, the CUA operators are responsible for determining who will report the clients, but if this is not clearly communicated, there is the potential for inaccurate reporting among them.*

3.4 Preserving Data

Technical details regarding actual data storage and retention are presented in Section 4.6, Data Archiving.

3.5 Accessing Data

CUA data are subject to the Privacy Act of 1974 and consequently a filing system of records notices is required and is handled by the Commercial Services Program.

Access to CUA records is controlled on a need-to-know basis by the parks' CUA Manager. Company-specific data (activities) are considered sensitive and the data are not publicly distributed. Details regarding user management and data security are outlined in SOP 3.

The web application interface admits internal park staff with permission to view the information. An external interface to the SWAN CUA web application is not available. Database roles are programmed to control user access. Database roles link active directory logons with database permissions. User access roles are defined with the following capabilities:

- Data Viewer (only able to see the data, cannot add or edit the data)
- Data Entry (can add or edit the data)
- Administrator (same permissions as Data Entry, plus able to grant or remove a person's access to the data)

4. Data Handling, Analysis and Reporting

4.1 Metadata

Metadata are data that provide technical descriptions of data kept in agency data stores. Data retained in agency databases are logically related where those relationships are defined by the application which consumes the data. The purpose of metadata is to define what a data entity is within the context of an application. This definition has multiple parts but one of the more essential aspects of metadata is to describe a particular data element's role in an application context that is comprised of innumerable, interoperating data elements. NPS agency data sets by policy are documented using metadata for information assurance. Information assurance assures protocol data, analyses, products, and reports are technically correct, well-documented, easily accessible, distributed, and properly interpreted by a diverse array of users in perpetuity (NPS 2008). Specifically for the CUA application, metadata include field definitions of the data submitted by CUA activity reports which include trip duration, location, and visitor activities. Metadata documents the following data structure:

```
<Data>
  <trip>
    <start date />
    <end date />
    <number of clients />
    <number of guides />
    <location 1 />
    <activity 1 />
    <visitor use days 1 />
    <location 2 />
    <activity 2 />
    <visitor use days 2 />
    <location 3 />
    <activity 3 />
    <visitor use days 3 />
  </trip>
</Data>
```

This data structure is sequenced chronologically in CUA activity reports.

SOP 1 outlines data handling processes, from activity reports to data upload, and provides field definitions for the activity reports. The CUA activity report form also includes a list of instructions for filling out fields in the form, as well as field definitions (metadata).

4.2 Overview of Database Design

A SQL Server database managed by SWAN will be the repository for the data submitted through CUA activity reports until a national application is developed. The general structure and table

relationships within the SWAN database are discussed in SOP 3. Derived figures and/or summary tables will be stored on the shared network (SWAN) drive.

The database is made up of three main tables: Account Year, Trip, and Location.

The 'Account Year' table holds basic information on the report turned in by the CUA operator. This includes the company's name and CUA ID, reporting park (ALAG locations are included in a KATM general report), the form used (KATM has two forms: Brooks Camp and KATM general, as fees for Brooks Camp are at a different rate than other locations in the park). There is also a field to indicate whether the company operated in the park in a given year.

The 'Trip' table is a child to 'Account Year.' The 'Trip' table holds information on trips the CUA operator undertook. The table holds a trip's start and end dates, number of clients, number of guides, and whether the trip is an unguided drop-off.

The 'Location' table is a child to 'Trip.' The 'Location' table holds the location name (visitor use monitoring area), primary activity for the location, and visitor use days (the total number of people multiplied by the number of days at location).

The visitor use database and associated SOPs are expected to change through time, and SWAN, park, and regional staff will adapt to changes in work flow, accordingly. Our strategy is to focus on data acquisition, processing, analysis, and reporting for those visitor use metrics that directly support the stated monitoring objectives.

4.3 Data Entry, Verification, and Editing

Where SWAN staff have the ability to do so, they will meet the following standards for scientific credibility: qualitative accuracy, completeness, consistency, and timeliness. Since this protocol relies on data harvested from CUAs' activity reports, rather than internal direct collection, a disclaimer is provided whenever the data are used or distributed. Doing so defends against situations where the audience could misconstrue the levels of precision and inference conveyed by the reported data. All necessary non-spatial data are acquired in or converted to a common and consistent format for analysis, reporting, storage and distribution. CUA operators currently calculate visitor use days from two fields (total number of people and days at a given location), as defined in Section 3.3 of the Methods, above. Currently, the data are formatted for presentation in Microsoft Excel. Visitor use data could also be represented spatially (e.g., through counts per visitor use days in monitoring areas), as needed. Each data set will meet the standards for format, quality, organization, and maintenance as set forth in the SWAN data management plan (Mortenson 2006).

Methods for data acquisition and review (Figure 6) are outlined in SOP 1 and Section 3.2 of the Methods, above. Data are first examined for completeness when the CUA operators turn in their activity reports to the region and park. After the reports have been entered into the database, a query is run to summarize the visitor use days for a given park across years. The summary provides monthly data by year, which are then reformatted using pivot tables to visually inspect the data for missing values by year (Table 1). In the table, a zero for a year would indicate that the CUA operator did not have any activity in the park. A blank cell (missing data) could be that a report has not yet

been submitted/entered or that the company no longer has a permit for the park. Park staff should also check values that are substantially greater or less than values in previous years (consistency check). Large changes (e.g., 10% or greater) in visitor use days could signal an error in reporting or in data entry, but may also reflect a real change in economic conditions (e.g., as in the loss of tourism in 2009, following the 2008 recession). A drop in number could indicate that an unreported error occurred when the data was being entered into the database and not all data got incorporated. A big increase could indicate that a report was mistakenly entered more than once. If large changes are identified, the park(s) verifies that year's data against the CUA operators' reports and checks whether the values were entered incorrectly. If an operator's report was incomplete or possibly erroneous when submitted to the park, it will be returned to the CUA operator for review and correction. Ideally, park resources might be made available to ground-truth the VUDs reported by CUA operators, but parks' capacity to do this has been limited, to date.

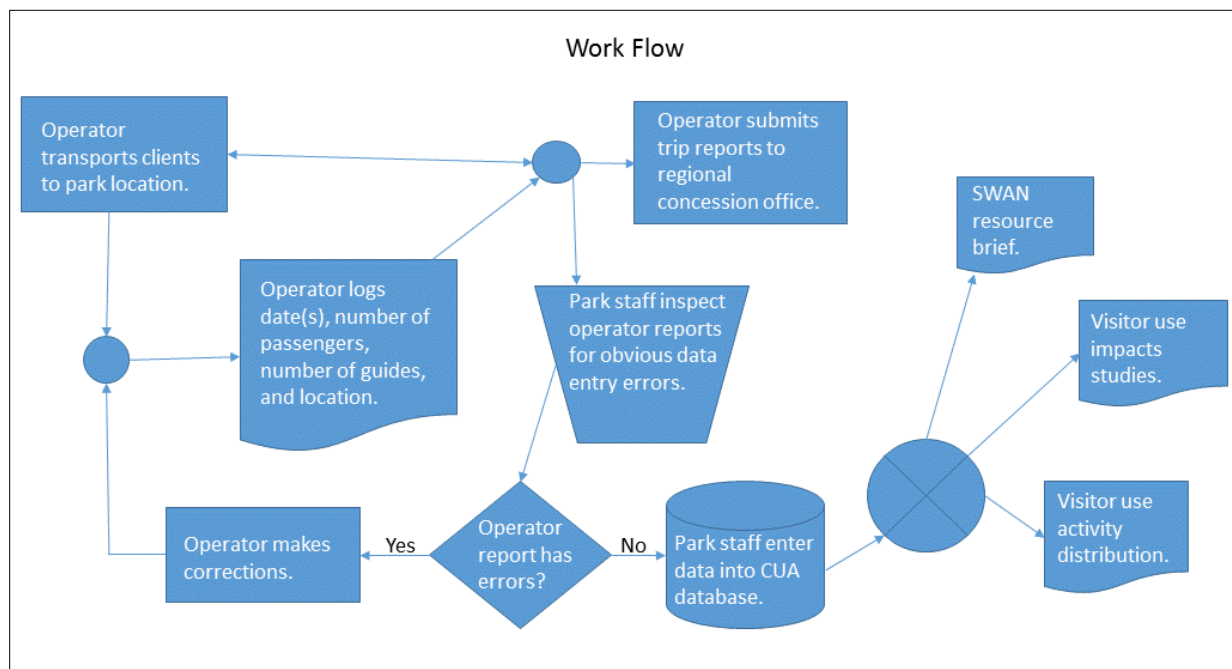


Figure 6. CUA Data Workflow

Table 1. An example of a pivot table to review the visitor use days by company and year. Missing values or big changes in numbers across the years could indicate an issue with the data in the database. Data shown here have been anonymized and are not representative of a given operator(s).

Company	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Company A	501	929	630	755	786	761	873	818	671	1365	8089
Company B	358	175	162	342	413	452	509	522	448	382	3763
Company C	–	–	–	146	278	176	200	131	113	0	1044
Company D	64	262	484	931	1262	845	897	877	893	512	7027

Table 1 (continued). An example of a pivot table to review the visitor use days by company and year. Missing values or big changes in numbers across the years could indicate an issue with the data in the database. Data shown here have been anonymized and are not representative of a given operator(s).

Company	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Grand Total
Company E	–	–	291	405	360	296	354	304	218	267	2495
Company F	–	–	–	–	0	294	250	674	681	–	1899
Company G	493	477	378	406	470	359	435	580	573	1053	5224
Company H	29	35	52	93	20	56	54	104	90	110	643
Company I	896	1356	723	769	983	529	938	646	425	–	7265
Grand Total	3107	4326	3719	4932	5730	4768	5560	5784	5306	4908	4870

In Table 1, above, companies F and I are missing reports for 2016. Potential explanations for this could be that the companies did not have a permit for 2016, or that the report have not been entered into the database; but, the status of the company should be checked. Companies A and G are showing a large increase and company D a decrease in visitor use day values. These numbers should be checked against the submitted reports to ensure that there was not an error in getting the data into the database. Company C has a zero for 2016, which indicated that they did not operate in the park that year.

4.4 Data Analysis

Data analysis supports two objectives. One objective is to meet quality assurance requirements and the other is to report visitor use patterns. In general, data management activities analyze visitor use data using the following constructs:

- Database Views (SQL Queries)
- Pivot Tables
- Graphs

After the data entered into the database have been reviewed by the parks, the data will be exported into Excel to generate graphs summarizing how visitor use numbers have changed over the years. SOP 2 elaborates on the computational processes used to generate data summaries for reporting.

4.5 Reporting

The goal of this protocol is to produce consistent and comparable monitoring information that can be used to support park management and decision making. Specific internal audiences for this protocol are park managers, park resource professionals and auxiliary park staff, including law enforcement and interpretation officials. External audiences include the CUA operators, who are provided updated resource briefs during the annual CUA meetings held by the parks.

SWAN summarizes and reports on visitor use data by park through annual resource briefs (SOP 2; Appendix B). SWAN also maintains a public web site and provides links to the resource briefs. More comprehensive reporting will be completed by the parks, as needed.

Visitor use data will be summarized and distributed annually to the parks in the form of resource briefs published on [SWAN's Reports and Publications web page](https://www.nps.gov/im/swan/reports-publications.htm) (<https://www.nps.gov/im/swan/reports-publications.htm>; accessed 8/8/18). These briefs include annual visitor use day values for the period of record (2007-current year for KATM and LACL), which can be different from the number of visitors who access the parks annually. The data summaries (by park and year) are also entered into the [Public Use STATS database](https://irma.nps.gov/Stats/) (<https://irma.nps.gov/Stats/>; accessed 8/15/17) by the parks, at which point the data become publicly accessible. Data from the CUA reports comprise a portion of the data required for Visitor Use Statistics (STATS) reporting. More detailed technical reports, if required by park management, will be the responsibility of the parks.

Data summaries that can be addressed by the CUA visitor use data include the following:

Visitor counts for an entire park – number of recreational visitors (excluding guides) summed over an entire park in a given time frame (month or year).

Visitor counts for a given location – number of recreational visitors (excluding guides) summed over a specific location in a given time frame (month or year). Since visitors may visit more than one location during a trip, the total number of visitors summed for the park (first bullet) is not equivalent to the sum of total visitors by location (second bullet).

Visitor use days by location – an index of potential impacts to resources in a visitor use monitoring area. Spatial and temporal travel patterns – e.g., peak visitation in specific visitor use monitoring areas.

4.6 Data Archiving

The region and parks have their own methods of maintaining and archiving the submitted CUA activity reports that is not covered in this document. SOP 3 outlines procedures for data management, including system security, managing users, backups, and other IT support.

When the parks are loading the data into CUA database, the submitted Excel files are converted to a CSV file, as outlined in Section 3.2 of the Methods. These CSV files are parsed by the database interface and loaded into database. Part of the database importing process is to save the CSV file in the database.

In lieu of a national CUA data storage resource, SWAN maintains a SQL Server database that serves as a repository for data that is extracted, transformed, and loaded from CUA activity reports. The general table structures and table relationships are outlined in SOPs 1 and 3. The SWAN CUA relational database is not structurally immutable and its evolution is governed by adaptive workflow policies set forth by regional and park stakeholders and administrators. The SWAN data manager leads the technical operationalization of database conformance with CUA business rules.

Network and regional information technology staffs have oversight of the long-term storage and preservation of the CUA database system. The CUA database is currently housed on a desktop PC running Microsoft SQL Server. This database is backed up daily to a server hosted in the Alaska Regional Office (AKRO) data center. The backup method relies on a scheduled Windows Powershell script which also restores the archived database to a separate SQL Server instance. The backups occur on a daily basis and the backup retention is one week. The AKRO data center subsequently stores the daily backups to offline storage media which is kept offsite for no less than one month.

5. Personnel Requirements and Training

5.1 Roles and Responsibilities

The SWAN data manager is the project lead for visitor use monitoring and works closely with park and regional concessions staff. Annual planning addresses the acquisition, management, analysis and reporting of visitor use data.

SWAN's data management team is responsible for the following:

- Maintain the Microsoft Excel files (Activity Reports) that are used by CUA permit holders.
- Maintain the visitor use database.
- Maintain the interface for the database (currently a locally hosted web site).
- Develop and maintain logical checks as data are entered into the database.
- Develop queries for analysis of the data.
- Create data summaries and annual resource briefs.
- Provide technical support to the parks for entering data into the database.

The park lead is responsible for reviewing the data submitted by CUA permit holders and performs the following:

- Review submitted CUA Activity Reports (Excel files) for errors or missing information.
- Correct issues with submitted CUA Activity Reports (may require contacting CUA permit holder).
- Enter data into the CUA Database (the Excel files can be converted to CSV format and loaded directly into the database). If the data upload process fails, the errors in the file need to be found and corrected.
- At the end of the year, review the CUA data. Check to see if any CUA permit holders' activity reports are missing. If there is a big shift in visitor use day numbers for a permit holder, investigate the current year's number to see if something happened during data upload (e.g., a CUA Activity Report was entered twice by mistake; only some of the data made it into the database; etc.; see Section 4.3 - Data Entry, Verification, and Editing).

If the information turned in is incomplete or has errors, the park lead will need to correct the errors before the data can be added to the database. The park lead will review the data for completeness for the year, and will ensure that all CUA permit holders have submitted reports.

5.2 Qualifications

SWAN's data management team needs to have an understanding of relational databases and be able to write queries (SQL statements) against the database. They also need to understand ASP web page and C# that powers the web interface to the database.

5.3 Training

Park staff that deal with the CUA activity reports and enter data into the database need to have an understanding of the relationship between the fields in the Excel file and database fields. The person entering the data into the database also needs to know what to look for in the CUA activity report that may cause an import error. SOP 1 covers the Excel files and the database interface. SWAN's data manager is available to provide training to park staff.

In order to comply with data confidentiality and application security requirements, network information technology staff undergo annual certification in the following areas:

- Privacy for Information Technology
- Controlled Unclassified Awareness
- Records Management Awareness and Section 508
- Cyber-awareness training
- DOI Rules of Behavior Instruction

6. Operational Requirements

6.1 Annual workloads

The Park CUA Manager, SWAN data manager, and the SWAN IT position are responsible for data related activities throughout the year (Table 2).

Table 2. Annual schedule of activities.

Timing	Activity	Responsibility
Winter — early spring	Review a blank CUA Activity Report before the coming season	Park CUA Manager. If changes are needed, SWAN data manager will update the files.
Summer — early fall	Review data entry web site	SWAN IT Position
Fall — winter	Enter CUA Activity Reports as they are submitted by commercial operators	Park CUA Manager
Late winter — early spring	Review data that has been entered into database	Park CUA Manager
Spring	Create resource briefs (before parks hold meeting with CUA permit holders, typically in early April)	SWAN data manager

6.2 Annual budget

The work load for the parks represents the time needed to review the data (reviewing the activity reports for completeness and end-of-year review for missing reports or unusual number changes). For SWAN staff, the work load is creating data summaries, resource briefs, maintaining the web interface, technical support and training to parks. Estimated annual operating costs (Table 3) include SWAN and park staff time to review CUA activity reports, enter/upload data from the activity reports, and complete a year-end review of the imported data. In addition, these costs include SWAN staff time for creating the resource briefs. The estimated costs below do not include park staff time required for entering data into the national STATS database, or WASO staff time to review and maintain STATS. The estimated operating costs also exclude management of CUA permit applications by park and regional concessions staff.

Table 3. Estimated annual operating costs (based on FY2018 dollars) for implementing the SWAN visitor use protocol. Personnel costs include salary and benefits.

Personnel	Costs ^A	Notes
SWAN Data Manager	\$ 2,000	1.0 week per year, GS-11 A
SWAN IT Position	\$ 4,340	2.0 weeks per year, GS-09 A
LACL/KATM CUA Manager	\$ 26,200	16.0 weeks per year, GS-09 A
Total	\$ 32,540	—

^A See <https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2018/AK.pdf>.

6.3 Infrastructure

The Visitor Use web-based application stack is built and sustained using Microsoft technologies.

- SWAN data management staff work in concert with regional office information technology staff to provision a Microsoft server that hosts internet information service known as “IIS.” IIS authenticates user access and marshals concurrent user service requests so that database information is stored, modified, and retrieved in a secure and balanced fashion. IIS web services are not exposed to public-facing web sites.
- A Microsoft SQL Server is a back-end, server-side data store that performs all data extraction, transformations, and loadings of visitor use data. Note that “SQL” stands for Structured Query Language and is essentially a computer programming language used specifically for data querying and data manipulation.
- The web interface for the Visitor Use application is constructed using the ASP (Application Service Provider) web programming language. Microsoft Visual Studio is an integrated code development environment that is used to author the ASP web application.

6.4 Network Information Technology Functions

SWAN information technology staff have oversight for coordinating and implementing solutions for the development and sustaining support of the visitor use technology stack. The development and operations workflow is a software and delivery process that emphasizes communication and collaboration between concessions management, software development, and park operations staff (Figure 7).

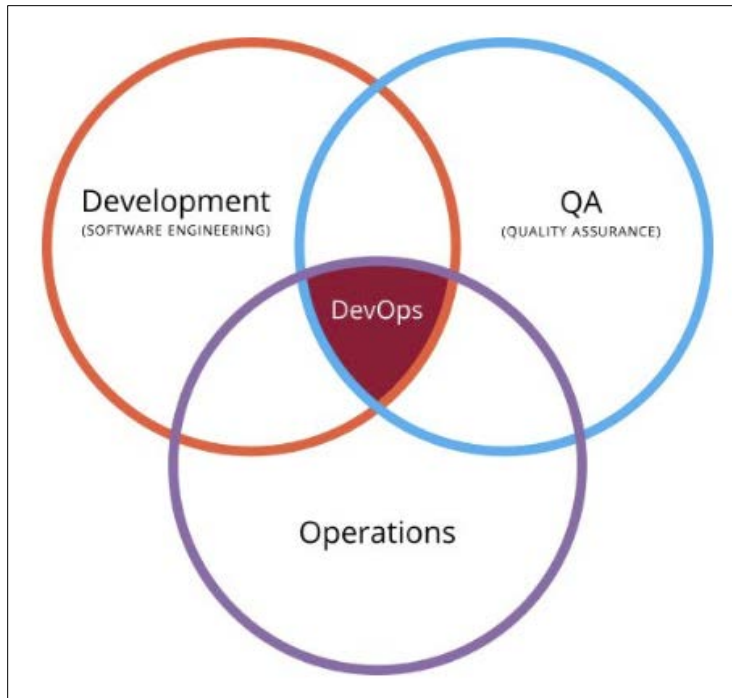


Figure 7. Venn diagram showing DevOps as the intersection of software development, operations, and quality assurance.

SWAN information technology staff are responsible for realizing the development and operations toolchain (Figure 8) elaborated on in SOP 3. This toolchain is comprised of the following work categories:

- CUA coding development and review
- Building software solutions that incorporate the use of web source codes and frameworks, reporting tools, and GIS products
- Testing software deployments to assess fault tolerance and compliance with CUA business rules
- Packaging software revisions for deployment to web servers
- Releasing software maintenance builds to address system bugs, refactored interfaces, and new business requirements
- Configuring Windows Server and IIS properties
- Monitoring applications performance and end-user experiences



Figure 8. Stages in SWAN information technology CUA development and operations toolchain.

In order to realize CUA operational stability, address business process revisions, and reduce risk, SWAN information technology staff engage in the following tasks:

- Configure and provide sustaining infrastructure support for (see SOP 3)
 - o Web server – front-end application
 - o Database server
- Build CUA web application on latest development stack
- Work with CUA web application users on maintenance items and new program functionality
- Develop and maintain database reports and views needed for annual resource briefs
- Develop database queries to address *ad hoc* inquiries
- Provide application security
- Provide disaster recovery
- Serve as a subject matter expert for business process analysis

7. Literature Cited

- Bennett, A. J., W. L. Thompson, and D. C. Mortenson. 2006. Vital sign monitoring plan, Southwest Alaska Network. National Park Service, Anchorage, Alaska.
- Cook, P. S. 2015. Impacts of visitor spending on the local and Alaska economies: Katmai National Park and Preserve, 2014. Natural Resource Report. NPS/NRSS/EQD/NRR—2015/1086. National Park Service, Fort Collins, Colorado.
- Deur, D. 2008. Alagnak Wild River visitor use project: Alagnak Wild River resident user study. Cooperative Agreement CA9088A0008. College of Forestry Resources, University of Washington. Seattle, Washington.
- Fay, G. 2007. Southwest Alaska Network long-term visitor use monitoring protocol development final report. National Park Service, Anchorage, Alaska.
- Fortin, J. K., K. D. Rode, G. V. Hilderbrand, J. Wilder, S. Farley, C. Jorgensen, and B. G. Marcot. 2016. Impact of humans on brown bears (*Ursus arctos*): A review and new management tool. PLoS ONE 11(1):e0141983. DOI: 10.3731/journal.pone.0141983.
- French, H. B. 2007. Effects of bear views and photography on brown bears (*Ursus arctos*) at Hallo Bay, Katmai National Park and Preserve, Alaska. MS Thesis, University of Alaska Fairbanks, Alaska.
- Mortenson, D. C. 2006. Data management plan for Southwest Alaska Network. National Park Service, Anchorage, Alaska.
- Monz, C. A. 2005. Monitoring visitor use and associated impacts in the Southwest Alaska Network. National Park Service, Anchorage, Alaska.
- National Park Service. 2008. Data management guidelines for inventory and monitoring networks. Natural Resource Report. NPS/NRPC/NRR—2008/035. National Park Service, Fort Collins, Colorado.
- Shepherd, T., and R. Frith. 2018a. Standard operating procedure 1: Data acquisition and retention version 1.0. Monitoring visitor use in Southwest Alaska Network. National Park Service, Anchorage, Alaska.
- Shepherd, T., and R. Frith. 2018b. Standard operating procedure 2: Data analysis and reporting version 1.0. Monitoring visitor use in Southwest Alaska Network. National Park Service, Anchorage, Alaska.
- Shepherd, T., and R. Frith. 2018c. Standard operating procedure 3: Data management version 1.0. Monitoring visitor use in Southwest Alaska Network. National Park Service, Anchorage, Alaska.

- Shepherd, T., and R. Frith. 2018d. Standard operating procedure 4: Revising the protocol version 1.0. Monitoring visitor use in Southwest Alaska Network. National Park Service, Anchorage, Alaska.
- Smith, T. S. 2002. Effects of human activity on brown bear use of the Kulik River, Alaska. *Ursus* 13:257–267.
- Smith, T. S., and B. A. Johnson. 2004. Modeling the effects of human activity on Katmai brown bears (*Ursus arctos*) through the use of survival analysis. *Arctic* 57(2):160–165.

Appendix A

The Excel CUA Activity Report file, Lake Clark used as an example.

National Park Service Commercial Use Authorization (CUA) Activity Report and Bill of Collection											Lake Clark National Park and Preserve									
4 Name of Business: _____											Summary									
5 CUA Number: _____											0 Total Clients									
☐ Check this box if you DID NOT OPERATE this year.											\$0.00 Total Payment									
< Accounting					Natural Resources Mgmt >						Optional Additional Location 2			Optional Additional Location 3						
1) Start Date [MM/DD/YYYY]	2) End Date [MM/DD/YYYY]	3) Total # of Days	4) Total # Clients	5) Total Fee (Box 3 x Box 4 x \$5.00)	6) Total # of Guides	7) Total # People (Box 4 x Box 6)	8) Unguided Overnight Drop off? Check, If Yes	9) Choose location from dropdown list (use boxes to the right for additional locations) *Only use placenames found on attached map*	10) Choose activity from dropdown list	11) Visitor Use Days (Box 7 x # of Days at Location)	Location 2	Activity 2	Visitor Use Days 2	Location 3	Activity 3	Visitor Use Days 3				
8/11/2011	8/14/2011	4	10	\$240.00	2	12	X	Chilikadrotna River	AT - Air Taxi	48	... SAMPLE ...									
8/15/2011	8/16/2011	2	5	\$60.00	1	6		Caribou Lakes	KT - Kayak Tours	6	Chilikadrotna River	CB - Charter Boat	6	... SAMPLE ...						

Figure A-1. A screen capture showing the Lake Clark National Park and Preserve's activity report.

Information collected on the CUA activity report form.

General Information:

- Name of Business
- CUA Number (assigned by Alaska Regional Concessions)
- Check this box if you DID NOT OPERATE this year (indicates that no clients were brought into the park)
- Summary:

- o Total Clients (sum of data in Box 4. Total Number of Clients)
- o Total Payments (sum of data in Box 5. Total fees collected)

Information on individual trips.

Accounting:

1. Start Date (MM/DD/YYYY) (start date of trip)
2. End Date (MM/DD/YYYY) (end date of trip, the date must equal or be later than Start Date)
3. Total Number of Days (calculated field from Start and End Dates)
4. Total Number of Clients
5. Total Fee (Box 3 x Box 4 x Fee Rate) (calculated field based on Total Days times Total Clients times fee rate (fee rate set individually by parks)).

Natural Resource Mgmt.:

1. Total Number of Guides
2. Total Number of People (calculated field based on Total Clients plus Total Guides)
3. Unguided Overnight Drop off? Check if Yes (clients were dropped off in park for a multi-day unguided trip)
4. Chose location from Dropdown list (use boxes to the right for additional locations) *Only use placenames found on attached map!* (name of visitor use monitoring area, see Figure A-1)
5. Chose Activity from dropdown list (primary activity that clients were involved in at location)
6. Visitor Use Days (Box 7 x Number of Days at Location) (total number of people times number of days at location)

Optional Additional Location 2:

- Location 2 (name of visitor use monitoring area, see Figure A-1)
- Activity 2 (primary activity that clients were involved in at location)
- Visitor Use Days 2 (total number of people times number of days at location)

Optional Additional Location 3:

- Location 3 (name of visitor use monitoring area, see Figure A-1)
- Activity 3 (primary activity that clients were involved in at location)
- Visitor Use Days 3 (total number of people times number of days at location)

Appendix B

An example of the resource brief that is generated for Katmai and Lake Clark. Example shown is a brief for Katmai National Park and Preserve published in April 2017.



Katmai National Park and Preserve

Visitor Use

Understanding visitor use patterns across the parks and over time allows park managers to assess where rangers and staff need to be stationed and where impacts to resources (such as trampling) may need to be monitored or mitigated in the future. Likewise, visitor use patterns may also inform commercial business operators (such as guides or air taxis) by providing insights to the areas currently visited and the timing of visits, details that are helpful when planning their services.

Park Visitation

Over the last ten years, the number of visitor use days reported by businesses operating in Katmai National Park and Preserve (NPP) has fluctuated between 25,000 and 30,000 per year. Visitation patterns are affected not only by sport fishing and bear viewing opportunities, but also by national events. The economic downturn in late 2008 affected the number of visitors in the 2009 season. Visitation for Brooks Camp dropped by almost 2,000 visitor use days, and took three years to recover (Figure 1).

Hallo Bay, Geographic Harbor/Amalik Bay, Kukak Bay, and Swikshak Lagoon are some of the most visited locations on the Katmai coast, receiving over 5,000 visitor use days per year (Figure 1). The annual variation in visitation to other interior sites is probably due to the change in the timing and magnitude of salmon runs connected to fishing and bear viewing opportunities. Figure 2 shows that most of the visitation for Katmai NPP occurs in July and August, with about 70% of the visitor use days occurring during these two months. July visitation in the park continues to grow (almost 12,000 visitor use days in 2016), whereas visitation in June and September declined or remained flat.

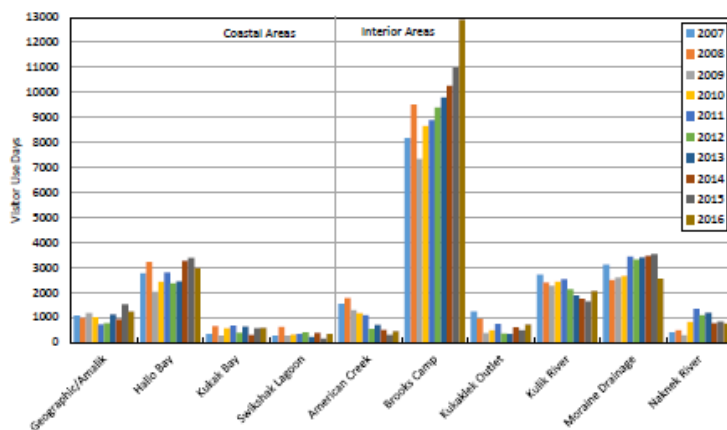
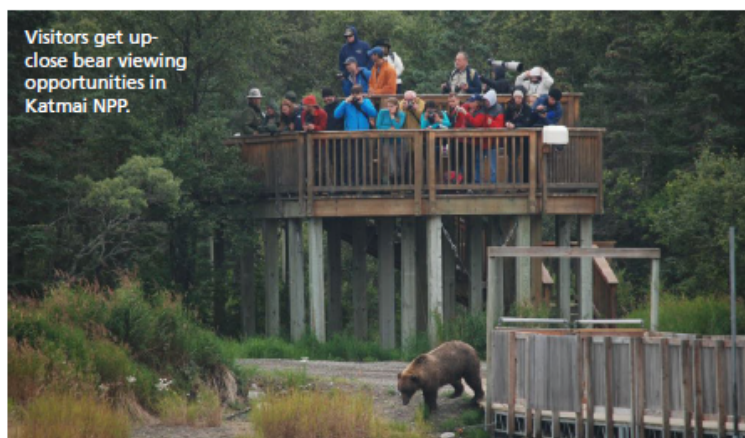


Figure 1. Visitor use days by year for select locations (2007-2016) in Katmai NPP, as reported by the commercial use operators. [Data from the Katmai NPP CUA database 04/15/17.]



Figure 3 provides a snapshot of where visitation occurred each month in 2016. Brooks Camp received more than 7,000 visitor use days in July when the bear numbers on Brooks River are at their peak, and much less in the other months. 2016 was also the first year that August visitation was higher at Brooks Camp than Moraine Creek/Drainage (Figure 3). The three main activities reported by commercial operators are sport fishing, bear viewing, and air taxi; these activities are not mutually exclusive (Figure 4). Other reported activities, such as big game transporters, hiking tours, and photography, continue to make up a very small percentage of visitor use days.

Methods

Remote Alaska parks do not have entrance stations to count people visiting the park, but the vast majority of visitors to Katmai NPP use a lodge, guiding service, or air taxi operator. These commercial operators pay a fee for each visitor they bring to the park, and report back to the park the number of visitors, activities visitors are engaged in, and where within the park visitors go. Each park is divided into areas, roughly corresponding to watersheds. Areas with concentrated use have been sub-divided into smaller areas to provide more specificity regarding the location of use. The data collected by commercial operators are the primary means to quantify and understand visitation patterns and public uses in Katmai.

A "visitor use day" is defined as each day a visitor is at the park engaging in some activity. Visitors who spend several days in the park will be counted each day according to where they go and what they do. This information is valuable for understanding how visitors enjoy the park and to identify potential management issues.

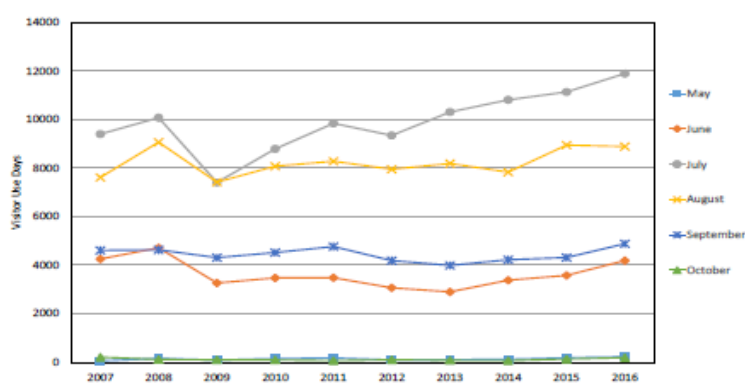


Figure 2. Monthly visitor use (May - October) for the years 2007-2016 in Katmai NPP. [Data from the Katmai NPP CUA database 04/15/17.]

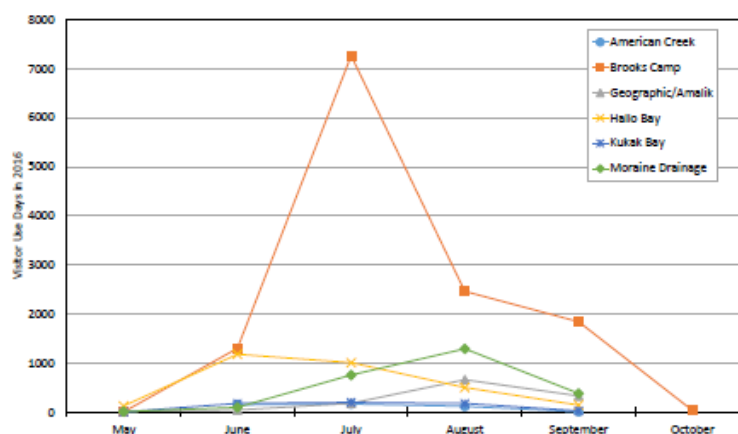


Figure 3. Areas with the highest visitor use by month in 2016. Areas represented are some of the most frequently visited locations in Katmai NPP. [Data from the Katmai NPP CUA database 04/15/17]

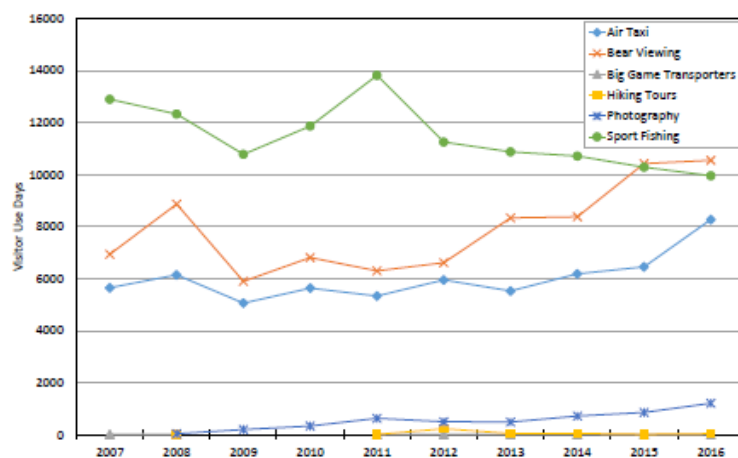


Figure 4. Visitor use days by activity as reported by the commercial operators working in Katmai NPP, 2007-2016. Sport fishing, bear viewing, and air taxi services continue to be the most popular activities in Katmai. [Data from the Katmai NPP CUA database 04/15/17.]

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 953/147643, August 2018

National Park Service
U.S. Department of the Interior



[Natural Resource Stewardship and Science](#)

1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525