

Plan Overview

A Data Management Plan created using DMP Tool

DMP ID: <https://doi.org/10.48321/D13644C943>

Title: Alaska Rural Remote Operations Work Plan (ARROW)

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Project Administrator: Ryan Marlow

Funder: United States Department of Transportation (DOT) ([transportation.gov](https://www.transportation.gov))

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Grant: <https://www.transportation.gov/grants/smart/fy23-smart-stage-1-notice-funding-opportunity-nof>

Template: SMART Grants Stage 1 Data Management Plan (DMP)

Project abstract:

The Alaska Department of Transportation & Public Facilities plans to create a scalable demonstration project, called the Alaska Rural Remote Operations Workplan (ARROW Program), that places Uncrewed Aerial Systems (UAS) in ten strategic locations to accomplish its inspection and maintenance needs while maximizing the public benefit of this technology in historically underserved communities.

Start date: 07-15-2023

End date: 01-15-2025

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Copyright information:

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Alaska Rural Remote Operations Work Plan (ARROW)

Dataset and Contact Information

Please provide as much of the the following information as possible:

1. Name of the project;
2. Grant number;
3. Name of the person submitting this DMP;
4. ORCID of the person submitting this DMP (need an ORCID? Register here: <https://orcid.org/>);
5. Email and phone number of the person submitting this DMP;
6. Name of the organization for which the person submitting this DMP is working;
7. Email and phone number for the organization;
8. Link to organization or project website, if applicable; and,
9. Date the DMP was written.

1. Alaska Rural Remote Operations Work Plan (ARROW)
2. MARTFY22N1P1G01
3. Ryan Marlow
4. 0009-0009-3221-7259
5. statewideaviation@alaska.gov, (907) 269-0728
6. Alaska Department of Transportation & Public Facilities
7. [ARROW Website](#)
8. 12/12/23

Data Description

Please provide as much information as possible:

1. Provide a description of the data that you will be gathering in the course of your project or data from a third party that you will re-use, if any;
 1. If there will be no data collected or re-used from another source, state that this is case;
2. Address the expected nature, scope, and scale of the data that will be collected, as best as you can at this stage;
3. As best as you can, describe the characteristics of the data, their relationship to other data, and provide sufficient detail so that reviewers will understand any disclosure risks that may apply;
 1. If data might be sensitive, please describe how you will protect privacy and security, if you know that now;
 2. You may need to update your DMP later to add more detail;
4. Discuss the expected value of the data over the long-term.

Description of Data Collection or Re-use

Data Gathering:

The ARROW program utilizes uncrewed aircraft systems (UAS) and remote sensing technologies to support operational activities. While these systems are capable of collecting imagery, video, and other sensor-based data, the data products submitted under this Data Management Plan are limited to UAS flight telemetry data only.

Telemetry data includes:

- Flight paths and trajectories
- GPS positioning and timestamps
- Altitude, speed, and heading
- Aircraft system status and operational metrics
- No imagery, video, or sensor-derived visual data will be included in publicly shared or submitted datasets under this effort.

Third-Party Data Re-use:

Existing datasets from Alaska DOT&PF and other state or federal partners may be referenced for operational context; however, no third-party imagery or sensitive datasets will be redistributed through this data submission.

Nature, Scope, and Scale of Data Collection

Nature of Data:

The data submitted is non-visual, non-identifiable telemetry data associated with UAS operations. It is structured, time-series data tied to aircraft performance and positioning.

Scope and Scale:

Data collection will occur across selected Alaskan communities during Stage 1, with potential expansion statewide in Stage 2. The dataset will scale with operations but remains limited to telemetry records only.

Characteristics of the Data and Disclosure Risks

Characteristics:

The dataset consists of structured telemetry data (e.g., coordinates, timestamps, and flight parameters) that does not include visual or personally identifiable information.

Relationship to Other Data:

Telemetry data may be used internally to support analysis alongside other datasets (e.g., infrastructure or environmental data); however, those datasets are not included in this data submission.

Disclosure Risks:

Disclosure risks are minimal due to the exclusion of imagery and sensitive data.

Potential risks related to infrastructure location awareness are mitigated through:

- Aggregation where appropriate
- Controlled release of precise flight paths if necessary

Protection of Privacy and Security

The ARROW program employs strict data governance practices to ensure privacy and security:

- No collection or release of imagery or video under this submission
- Role-based access control (RBAC) for all operational datasets
- Secure storage and transmission of telemetry data
- Segregation of sensitive operational data (e.g., critical infrastructure missions)

Sensitive datasets generated during operations (e.g., imagery or video) are retained in controlled environments and are not part of the publicly shared data under this plan.

Long-term Value of the Data

The telemetry data collected provides long-term value by:

- Supporting analysis of UAS operational performance in remote environments
- Informing future deployment strategies for scalable drone operations
- Contributing to national research on beyond visual line of sight (BVLOS) and remote operations
- Enabling optimization of flight efficiency, coverage, and system reliability

By limiting shared datasets to telemetry data, the program balances transparency and research value with privacy, security, and infrastructure protection requirements.

Data Format and Metadata Standards Employed

Please provide as much information as you can:

1. Describe the anticipated file formats of your data and related files;
2. To the maximum extent practicable, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future;
 1. If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.
3. Identify the metadata standards you will use to describe the data.
 1. At least one metadata file should be a DCAT-US v1.1 (<https://resources.data.gov/resources/dcat-us/>) .JSON file, the federal standard for data search and discovery.

Anticipated File Formats of Data and Related Files:

The ARROW program will utilize system-generated exports from UAS platforms (e.g., Skydio), which produce structured telemetry datasets. These datasets are exported in tabular formats (e.g., CSV or Excel) and include operational flight metadata.

Telemetry Dataset Fields Include:

- Flight ID
- Vehicle
- Organization (anonymized operator)
- Local Takeoff Time
- Takeoff and Landing timestamps
- Takeoff Address
- Takeoff Latitude / Longitude
- Landing (timestamp)
- Duration (seconds)
- Battery usage
- Sensor Package (system-generated field)
- Attachment fields (TOP, BOTTOM, LEFT, RIGHT — system-generated)
- Carrier(s) (communication method)

These fields are part of the standardized system export schema and are not modified prior to ingestion.

Use of Platform-Independent and Non-Proprietary Formats:

The exported datasets are stored and shared in:

- CSV (.csv) and/or Excel (.xlsx) formats

CSV is the preferred format for long-term storage and interoperability due to its platform-independent nature.

Where Excel formats are generated by the system, they can be readily converted to CSV without loss of data.

Rationale for Inclusion of System-Generated Fields

Certain fields (e.g., Sensor Package, Attachment fields, and Carrier(s)) are included as part of the native export schema of the UAS platform.

- These fields do not represent shared imagery, video, or sensor payload data
- They are descriptive system metadata only
- No associated imagery, video, or sensor-derived datasets are included in this data submission

This approach ensures consistency with system outputs while maintaining compliance with data-sharing limitations defined in this Data Management Plan.

Metadata Standards:

The ARROW program will apply the following metadata standards:

- DCAT-US v1.1 (JSON) — for federal data cataloging and discoverability
- FGDC or ISO 19115 (as applicable) — for geospatial reference fields (e.g., latitude/longitude)

Metadata will describe:

- Dataset structure and field definitions
- Data origin (UAS telemetry export)
- Temporal coverage
- Geographic scope (generalized as appropriate)
- Data access limitations

DCAT-US v1.1 Compliance

A DCAT-US v1.1 compliant JSON metadata file will be created to accompany the dataset.

This file will include:

- Dataset title and description
- Keywords and themes
- Distribution formats (CSV, Excel)
- Access instructions
- Organizational ownership (Alaska DOT&PF)

Metadata File Creation and Management:

Metadata will be developed and maintained alongside system-generated datasets using:

- Structured metadata templates aligned with DCAT-US
- Internal data management workflows within DOT&PF

System-generated field names are preserved to ensure traceability and consistency with source data systems.

Access Policies

In general, data from DOT-funded projects must be made publicly accessible. Exceptions to this policy are: data that contain personally identifiable information (PII) that cannot be anonymized; confidential business information; or classified information. Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take to protect privacy and confidentiality prior to archiving your data, and any additional concerns. In general, in matters of human subject research, your DMP should describe how your informed consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality. Additionally, when working with, or conducting research that includes Indigenous populations or Tribal communities, researcher will adhere to the CARE Principles for Indigenous Data Governance <https://www.gida-global.org/care> and make an explicit statement to that effect in this portion of the DMP. Please provide as much information as possible:

1. Describe any sensitive data that may be collected or used;
2. Describe how you will protect PII or other sensitive data, including IRB review, application of CARE Principles guidelines, or other ethical norms and practices;
 1. If you will not be able to deidentify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use;
3. Describe any access restrictions that may apply to your data;

4. If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators or other project staff.

Sensitive Data in ARROW Program

The ARROW program utilizes UAS platforms capable of collecting a variety of data types during operations; however, the data included under this Data Management Plan is limited strictly to flight telemetry data.

Types of Sensitive Data:

- The submitted dataset does not include imagery, video, audio, or direct personally identifiable information (PII)
- Telemetry data consists of: GPS coordinates
- timestamps
- flight parameters (altitude, duration, battery, etc.)

Potential Sensitivities:

- Geographic coordinates may relate to transportation infrastructure or operational locations
- Operator identity has been anonymized to an organizational level

Protection of PII and Sensitive Data

- No PII is collected or shared within the submitted dataset
- No human subject data is involved in this project
- As a result, Institutional Review Board (IRB) review is not required

Security Measures Include:

- Role-based access controls (RBAC) for internal datasets
- Secure storage and transmission of telemetry data

Separation of operational datasets (e.g., imagery, video) from publicly shared telemetry data

Application of CARE Principles (Indigenous Data Governance)

The ARROW program operates in collaboration with rural and Tribal communities and adheres to the CARE Principles for Indigenous Data Governance (Collective Benefit, Authority to Control, Responsibility, and Ethics).

This includes:

- Respecting Tribal authority over data collected within their communities
- Ensuring data use supports community benefit and decision-making
- Limiting public release of data that could impact culturally sensitive locations or resources
- Coordinating with Tribal partners on data governance practices where applicable

Deidentification and Data Utility

- The dataset does not contain direct identifiers and does not require traditional deidentification methods (e.g., masking or redaction)
- Operator information has been generalized to an organizational level
- Where necessary, location data may be:
 - generalized
 - aggregated
 - or restricted

to reduce risk while maintaining dataset utility

Access Restrictions

The ARROW program employs a tiered access approach:

Public Data:

- Flight telemetry datasets with no PII or sensitive content

Restricted Data (Not Included in This DMP):

- Imagery and video
- Emergency response operations
- Sensitive infrastructure or culturally significant locations
- Access to restricted datasets is limited to authorized personnel and partner agencies.

Stewardship and Responsibility

- Data Owner: Alaska DOT&PF
- Data Manager: Remote Sensing Lab (RSL)
- Data Access Control: Managed through DOT&PF systems and policies

Responsibilities include:

- Ensuring compliance with data governance policies
- Monitoring data access and usage
- Maintaining separation between public and restricted datasets

Re-use, Redistribution, and Derivatives Products Policies

Recipients are reminded:

1. **Data, as a collection of facts, cannot be copyrighted under US copyright law;**
2. **Projects carried out under a US DOT SMART Grants is federally funded; therefore, as stated in grant language:**
 1. **Recipients must comply with the US DOT Public Access Plan, meaning, among other requirements, project data must be shared with the public, either by the researchers or by US DOT;**
 2. **That by accepting US DOT funding through this grant, recipients have granted to US DOT a comprehensive non-exclusive, paid-up, royalty-free copyright license for all project outputs (publications, datasets, software, code, etc.). This includes all rights under copyright, including, but not limited to the rights to copy, distribute, prepare derivative works, and the right to display and/or perform a work in public; and,**
 3. **In accordance with Chapter 18 of Title 35 of the United States Code, also known as the Bayh-Dole Act, where grant recipients elect to retain title to any invention developed under this grant, US DOT retains a statutory nonexclusive, nontransferrable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any such invention throughout the world.**

Please provide as much information as possible:

1. **Describe who will hold the intellectual property rights for the data created or used during the project;**
2. **Describe whether you will transfer those rights to a data archive, if appropriate;**
3. **Identify whether any licenses apply to the data;**
 1. **If you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP;**
4. **Describe any other legal requirements that might need to be addressed.**

Intellectual Property Rights and Data Sharing

- **Rights Holder:** The US DOT holds intellectual property rights for data created or used in the ARROW program as it is a federally funded project.
- **Public Access Compliance:** In alignment with the US DOT Public Access Plan, ARROW data will be shared with the public. This ensures transparency and broad accessibility of research outputs.
- **Data Archiving:** Where appropriate, certain data rights may be transferred to public data archives to facilitate wider access and preservation.

Licensing and Terms of Use

- **Open Licensing:** Data generated by ARROW will typically be subject to open licenses, allowing public use and distribution. Creative Commons licenses or similar open licenses may be applied.
- **Terms of Use and Citation:** The DMP mandates clear terms of use and data citation requirements. Users of the ARROW data are required to adhere to these terms, ensuring proper attribution and responsible usage.

Compliance with Legal Requirements

- **Bayh-Dole Act Adherence:** In compliance with the Bayh-Dole Act, should ARROW retain title to any inventions, US DOT reserves a nonexclusive, irrevocable license to use these inventions for or on behalf of the United States.
- **Invention Reporting and Disclosure:** All inventions developed under the ARROW program will be reported and disclosed as per federal regulations.
- **Data Protection and Privacy:** The program commits to the protection of personal and sensitive data in compliance with relevant data protection laws and ethical standards.

Policy Implementation

- **Data Monitoring and Enforcement:** Regular monitoring mechanisms will be established to ensure compliance with this policy, including the enforcement of licensing terms and data usage restrictions.
- **Responsibility and Oversight:** The Principal Investigators and ARROW program staff are responsible for implementing this policy, ensuring data integrity, and maintaining compliance with federal guidelines.

Amendments and Updates

This policy is subject to review and amendments to remain aligned with evolving federal regulations, technological advancements, and best practices in data management.

This Data Management Policy serves as a guideline for the ethical, legal, and responsible management of data within the ARROW program, ensuring compliance with US DOT requirements and broader commitments to data accessibility and integrity.

Archiving and Preservation Plan

Please provide as much information as possible:

1. **State where you intend to archive your data and why you have chosen that particular option;**
2. **Provide a link to the repository;**

3. You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability;
 1. Whatever archive option you choose, that archive should support the capture and provision of the US Federal Government DCAT-US Metadata Schema <https://resources.data.gov/resources/dcat-us/>
4. In addition, the archive you choose should support the creation and maintenance of persistent identifiers (e.g., DOIs, handles, etc.) and must provide for maintenance of those identifiers throughout the preservation lifecycle of the data;
5. Your plan should address how your archiving and preservation choices meet these requirements.

Archiving Policy Overview

Primary Repository:

The ARROW program will archive publicly accessible datasets in Figshare.

Rationale:

- Supports persistent identifiers (DOIs)
- Supports public access and long-term preservation
- Compatible with federal open data and discoverability requirements
- Enables structured metadata aligned with DCAT-US standards

Secondary Access Platform:

Data will also be made accessible through ArcGIS Online, including a public-facing hub site.

Role of ArcGIS Online:

- Visualization and access layer (maps, dashboards)
- Not the authoritative archive
- Provides user-friendly access to datasets hosted in Figshare

Repository Access

- Primary archive (Figshare): Public dataset hosting and DOI assignment
- Secondary access (ArcGIS Hub): Public-facing portal for exploration and visualization

Dataset Description for Archiving

The dataset archived under this plan consists of:

- UAS flight telemetry data exported from system-generated logs
- Structured tabular data (CSV/Excel formats)

Fields include:

- Flight ID
- Vehicle
- Organization
- Local Takeoff Time
- Takeoff / Landing timestamps
- Takeoff Address
- Takeoff Latitude / Longitude
- Duration
- Battery
- Sensor Package (system-generated metadata only)
- Attachment fields (system-generated metadata only)
- Carrier(s)

Metadata and Discoverability

Each archived dataset will include sufficient metadata to ensure discoverability and usability.

Metadata will include:

- Dataset title and description
- Keywords and themes
- Temporal coverage (date range)
- Geographic coverage (generalized where appropriate)
- Data format (CSV, Excel)
- Data owner and contact information
- Data access level and usage notes

DCAT-US Metadata Compliance

The ARROW program will produce metadata compliant with the DCAT-US v1.1 standard.

- A DCAT-US compliant JSON metadata file will accompany each dataset
- Figshare supports metadata export and integration aligned with federal discovery requirements

- Metadata will be structured to support ingestion into federal data catalogs

Persistent Identifiers

- Each dataset archived in Figshare will be assigned a Digital Object Identifier (DOI)
- DOIs will provide:
 - Persistent access
 - Long-term citation capability
 - Traceability across the data lifecycle
- The repository ensures maintenance of identifiers over time, even if dataset storage locations evolve

Data Preservation and Lifecycle Management

The ARROW program ensures long-term preservation through:

- Storage in a managed repository (Figshare) with preservation policies
- Use of non-proprietary formats (CSV, JSON where applicable)
- Version control and dataset updates as needed

Telemetry datasets will remain accessible for long-term public use in accordance with U.S. DOT requirements.

Compliance with Federal Requirements

This archiving approach meets U.S. DOT requirements by:

- Providing public access to project data
- Supporting DCAT-US metadata standards
- Ensuring persistent identifiers (DOIs)
- Enabling long-term preservation and discoverability

Responsibility and Oversight

- Data Management and Publication: ARROW program staff and DOT&PF
- Repository Management: Figshare platform
- Public Access Interface: ArcGIS Online Hub

Responsibilities include:

- Preparing datasets and metadata for publication
 - Ensuring compliance with federal standards
-

Planned Research Outputs

Dataset - "ARROW_UAS_Flight_Telemetry_AlaskaDOTPF_2023-07-15_to_2025-01-15.xlsx"

This dataset contains UAS flight telemetry data collected under the Alaska Department of Transportation & Public Facilities (DOT&PF) ARROW Program as part of the U.S. Department of Transportation SMART Grant.

The dataset consists of system-generated flight logs exported from UAS platforms (Skydio) and includes fields such as flight identifiers, timestamps, takeoff and landing information, GPS coordinates, duration, battery usage, and related operational metadata.

All data fields are part of the native system export and have not been modified. Fields such as "Sensor Package," "Attachment (TOP/BOTTOM/LEFT/RIGHT)," and "Carrier(s)" are system-generated metadata only and do not contain or reference imagery, video, or sensor-derived data.

No imagery, video, audio, or personally identifiable information (PII) is included in this dataset. Operator information has been anonymized to an organizational level.

This dataset is provided for public access in accordance with U.S. DOT data sharing requirements and supports research, operational analysis, and the advancement of scalable UAS deployment in remote and rural environments.

Planned research output details

Title	Type	Anticipated release date	Initial access level	Intended repository(ies)	Anticipated file size	License	Metadata standard(s)	May contain sensitive data?	May contain PII
ARROW_UAS_Flight_Telemetry_AlaskaDOTPF_2023-07-15_ ...	Dataset	2026-04-01	Open	Figshare		Creative Commons Attribution 4.0 International	None specified	No	No