UAV & Community Mapping Framework

Guidebook

2024

FIRST NATIONS FISHERIES LEGACY FUND

Skeena Fisheries

syilx Okanagan Nation Alliance

The Map Shop · UVic Geography

BIG LITTLE MAPS

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UAV & Community Mapping Framework

Successful First Nation salmon habitat stewardship through geospatial technologies and community mapping requires several well-planned steps from evaluating existing human and technological resources to performing cultural and ecological assessments of habitat health and well-being. While the specifics of each step will vary depending on the First Nation conducting the work and local environmental features, a general framework has been developed to assist Nations with completing the necessary tasks for ensuring that a habitat assessment is conducted with both cultural and technological awareness. This report outlines six main steps to help guide First Nations through this process.

1. Personnel, Data and Technology Inventory

Objective: A critical step in developing a salmon habitat assessment is evaluating what resources are available to a specific First Nation. We encourage Nations to conduct an inventory of personnel and their technical skill sets, the types of data available to them, and a list of UAV, surveying and GIS technologies and software at their disposal.

1.1 Recruitment Email

An email should be sent to all relevant individuals that can provide the necessary information on resources. An example of a recruitment email is:

> Hello,
> My name is (*name*), and I am (*state your position*). I am conducting a community-based research project in partnership with (*state the Nation(s) you are working with and information about the project*). The first stage of this project is focused on creating an inventory of baseline data, local fish habitat knowledge, and geospatial technologies available to each First Nation for undertaking long-term salmon habitat monitoring. This inventory will inform how we address opportunities for capacity building in each First Nation by providing targeted training in community asset mapping, data collection with the use of remotely piloted aircraft (also known as drones), and spatial analytics of fish habitat data. Outputs from this work will be used to inform the long-term conservation of salmon. Your team is invited to participate in an online survey to identify the personnel, equipment, and knowledge that is available to conduct long-term salmon monitoring. The information you provide is confidential and you are free to withdraw your submission at any time.
> Thank you very much for your time. Please do not hesitate to let me know if you have any questions.

1.2 Survey

A survey can be customized depending on the project, but should at the very least ask for information on the following:

- Do individuals have experience flying UAVs? If so, what kind?
- Do individuals have a UAV license? If so, what level?
- How familiar are individuals with geospatial technologies?
- Does the team have access to a UAV? What kind? What are its capabilities?
- Does the team have access to advanced UAV sensors?
- Does the team have access to GPS/GNSS equipment?
- What computing power is available?
- Have members of the team been involved in community mapping?
- Does the team have existing spatial data related to salmon habitat?
- What salmon species are of interest?

An example survey is provided in Appendix A. Once the survey has been completed, the team can identify the type of training that is needed for the UAV operations and data processing as well as in community mapping. In addition, the survey will allow the team to determine the types of technologies that would be required for purchasing.

2. UAV & Related Technology Aquisition Processes

The process of purchasing UAVs and related technology requires an understanding of what a particular team is wanting to achieve when conducting a salmon habitat assessment.

Will basic site reconnaissance need to be performed?
If the answer is yes, then it is recommended that a small inexpensive UAV is purchased that is easy to deploy and replace if damaged or lost. This UAV could also serve as a training drone that may not require permission for flying in controlled airspace. One example would be a DJI Mini.

Is there interest in collecting only ortho-imagery, or will LiDAR and thermal data also be helpful?
Most UAVs are equipped with cameras that can collect ortho-imagery data, which is essentially the same as photographs from a camera. The quality of the camera on the UAV will determine the amount of detail that can be captured, higher end cameras typically collect higher detailed (or higher resolution) images.

Collecting either LiDAR or thermal data will require specific sensors that can be mounted on a drone. There is a large range of prices for these sensors, but it is likely that the lower-cost ones are sufficient for assessing the quality of salmon habitat. Whatever the decision, it is critical that the sensor and UAV are compatible with each other, and that the sensors can be easily changed if there is a desire to use multiple sensors on the same UAV platform. DJI offers UAVs and sensors that meet these needs at a price that is relatively low compared to other vendors.

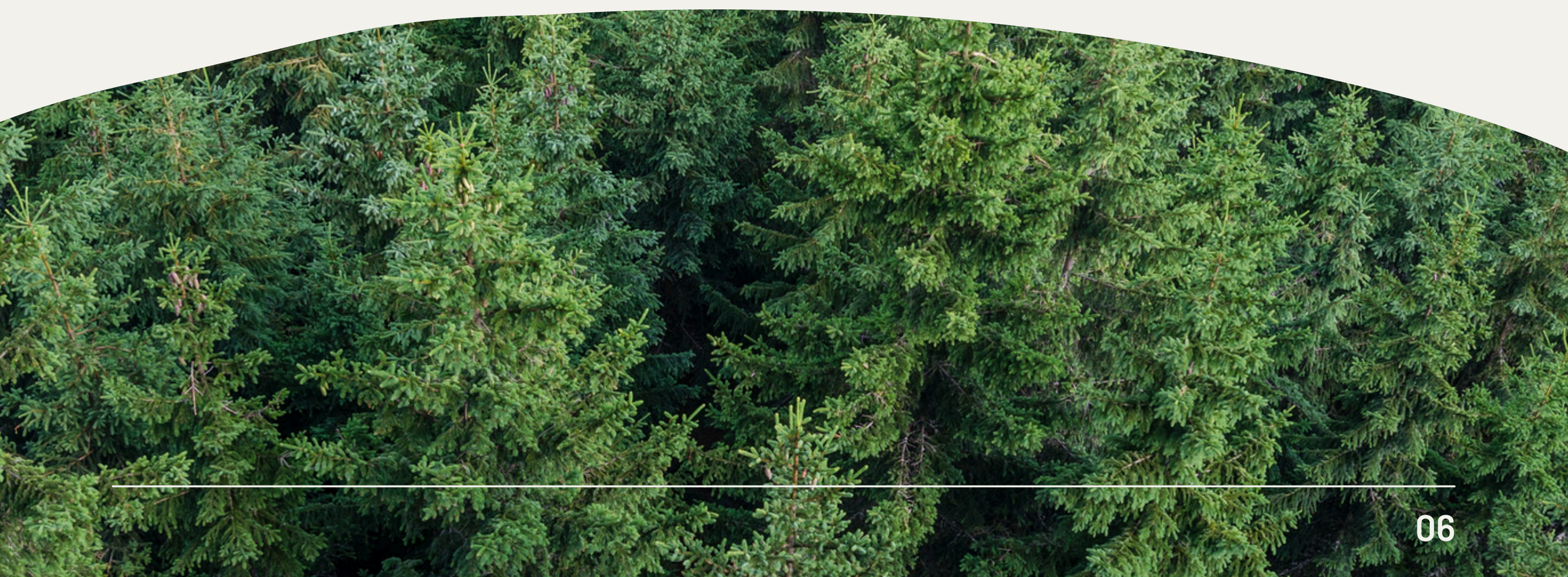
Is there interest in comparing data from one year to another, or aligning UAV-collected data with existing data?

Surveying equipment is a necessity if there is a desire to compare or integrate multiple datasets. This requires using Global Navigation Satellite System equipment that is typically more advanced than a typical handheld GPS receiver. Real-time Kinetic (RTK) survey equipment can be very expensive, but it permits one to collect incredibly high accuracy and high precision locations that can be identified in the collected data and used to reduce any known errors. This data can also be used to integrate multiple datasets by aligning them based on these known locations collected from the RTK equipment. Similar to sensors, there is a wide range ($6,000 - $100,000) for an RTK set, but the less expensive options are generally suitable for salmon habitat assessments.

What is the team's experience with processing remote sensing data?

Teams with less experience will want to purchase software that requires less training and knowledge about the technical aspects of how to operate the software. For example, DJI provides software called Terra that permits users to easily process and correct errors in ortho-imagery, LiDAR data and thermal data. However, this software and other easily accessible software come with the trade-off that advanced operations are limited. For teams with a high level of geospatial software expertise, more advanced options such as Pix4D are available that allow users to manipulate data in more complex ways. Also, free and open-source software is available for completing some of these tasks, but they are often limited in scope and require extensive user knowledge of how they operate.

An example of equipment purchased for a salmon habitat assessment is provided in Appendix B.



3. UAV Training

3.1 UAV Transport Canada Certification

It is recommended that team members interested in obtaining a Transport Canada Advanced UAV License enroll in a UAV field school hosted by one of the many drone companies in British Columbia. This training provides participants with the knowledge necessary to complete their Advanced UAV Pilot License, which is necessary to be able to fly UAVs in restricted air space as per Transport Canada regulations. The course also provides participants with advanced knowledge for conducting UAV flights in a variety of weather and environmental conditions, and performing flights with high consideration for personal, crew and civilian safety.

If flying in restricted airspace is not necessary, however, then a Basic UAV Pilot License will be sufficient certification, and completing the full Advanced UAV Pilot License testing regime provides limited additional value.

3.2 UAV Flight Practice

Before conducting a flight mission, new pilots should conduct practice flights to develop their operator skills. While UAV certification courses provide valuable knowledge on safely operating a UAV, additional practice is recommended to help develop an operator's skill set and confidence. Utilizing a smaller, more inexpensive UAV might be a good option for newer operators. Ensuring that pilots are comfortable setting up and operating a UAV will help to ensure that flight missions go smoothly.

3.3 UAV Flight Planning

UAV flights must be carefully planned to ensure the safety of everyone involved and to increase the likelihood of successfully collecting data. As shown in the diagram below, there are four main phases to this process:

1. Determining site location
2. Determining flight objective, required sensors and data specifications
3. Defining the area to be mapped and a respective flight route
4. Establishing and setting parameters for the route

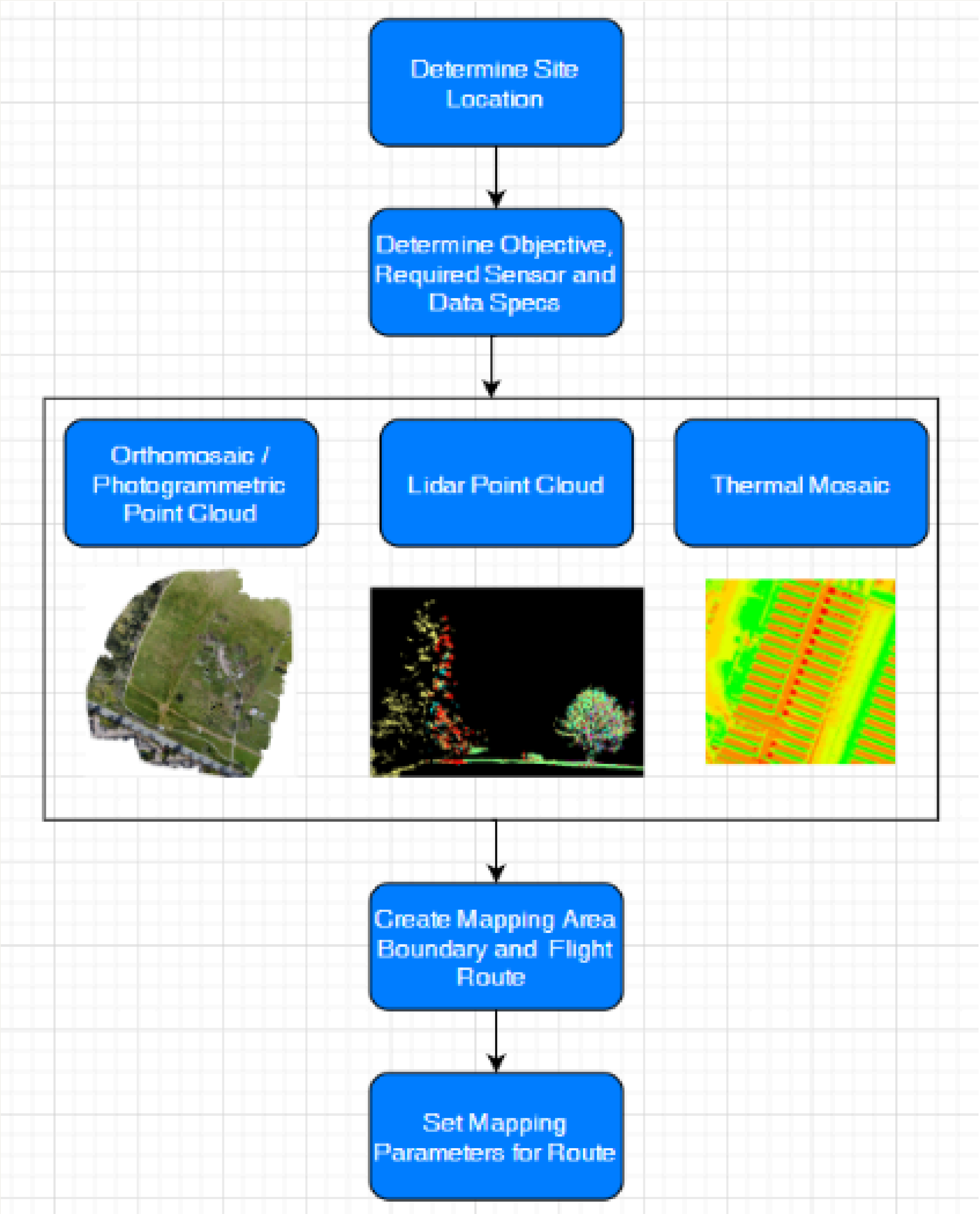


Figure 1. UAV flight planning flow chart.

4. Community Mapping Training

The process of community mapping can take many forms depending on community goals, the technology used, and the area of study, but essentially community mapping is a straightforward concept; community members work together to create maps using the knowledge, skills, values, and stories held in communities. This is a simple but powerful concept that is as much about the process as it is about the result. Coming together to create maps gives community members an opportunity to connect, share stories, have their voices and values heard, and work to create change in their communities.

An example of the community mapping process as used for this project is shown in the following diagram:

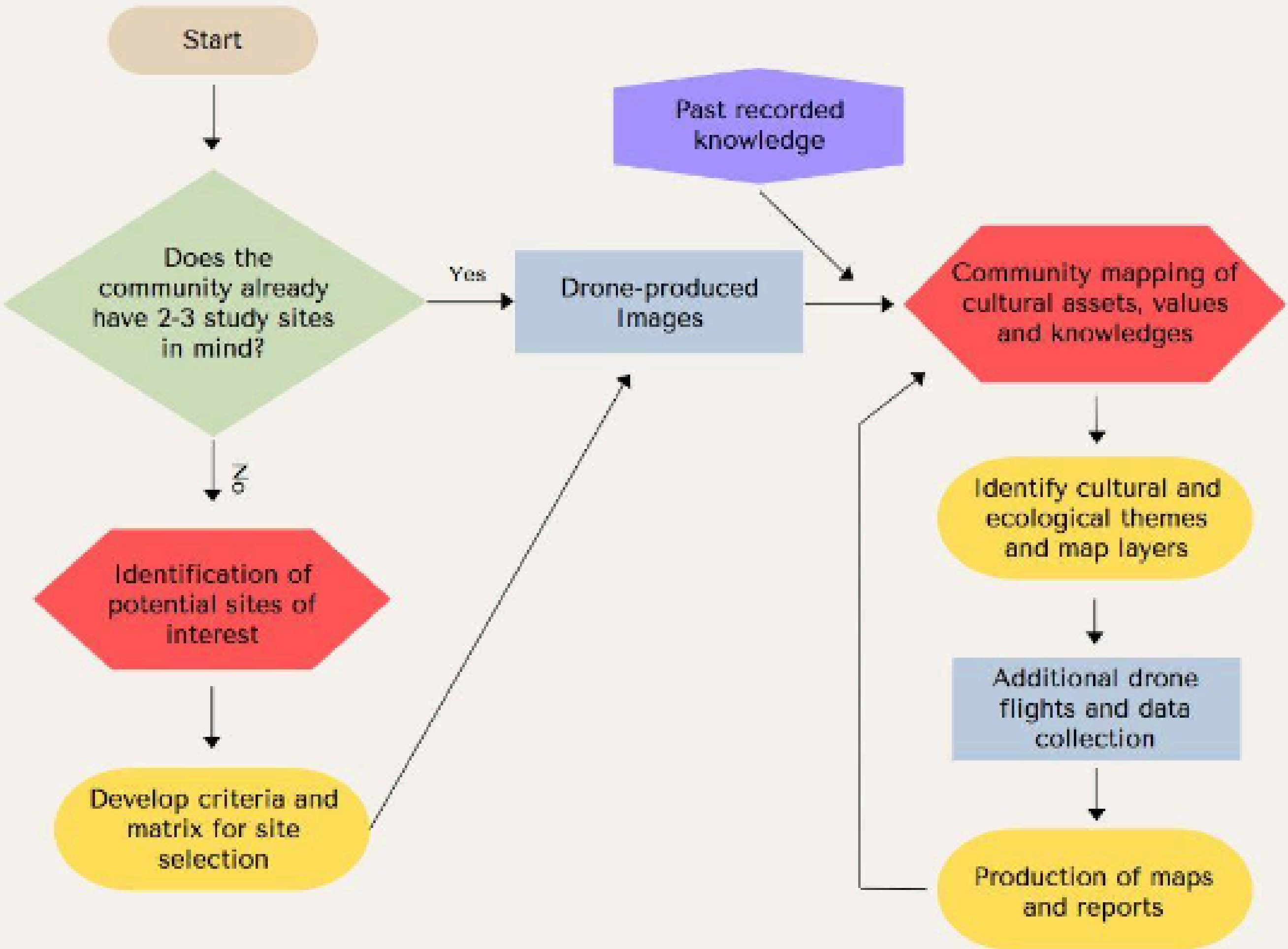
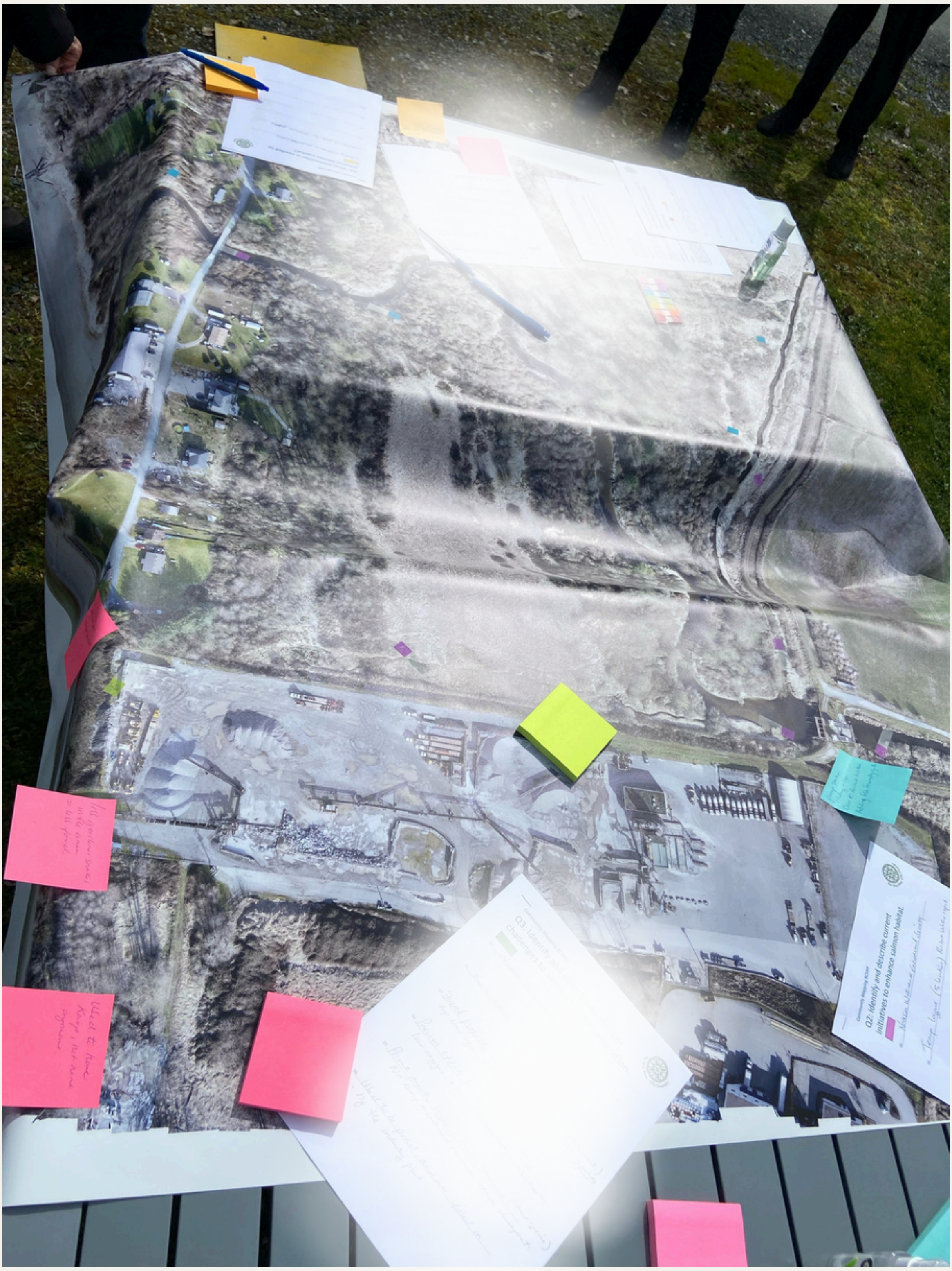


Figure 2. Community mapping process flow chart.

First Nations who would like to conduct community mapping can find more detailed guidelines in the Community Mapping Guidebook that was produced as a deliverable of this project. This guidebook provides background information, community mapping methods, best practices, suggested materials, and instructions for facilitating a community mapping process. Additional guidance on the community mapping process can also be found in the Community Mapping Training Video.



5. Rapid Salmon Habitat Assessment Training

5.1 Developing a Salmon Habitat Assessment Project

Rapid Salmon Habitat Assessment (RSHA) procedures will look different depending on specific community needs and/or aspirations that are identified through community mapping exercises. RSHA procedures will also vary depending on results of the initial survey, UAV and related technology acquisition, and UAV training processes outlined in steps 1, 2, and 3 above. Initial stages of a RSHA will include establishing a project and seeking out partnerships to execute the project. When working with partners, co-development of a **memorandum of understanding (MOU)** is recommended to ensure that all parties understand their roles and responsibilities. An example template for developing an MOU can be found in Appendix C of this document. An inventory of equipment and key personnel (similar to that conducted in step 1 above) should also be conducted with project partners to account for all resources available to the project.

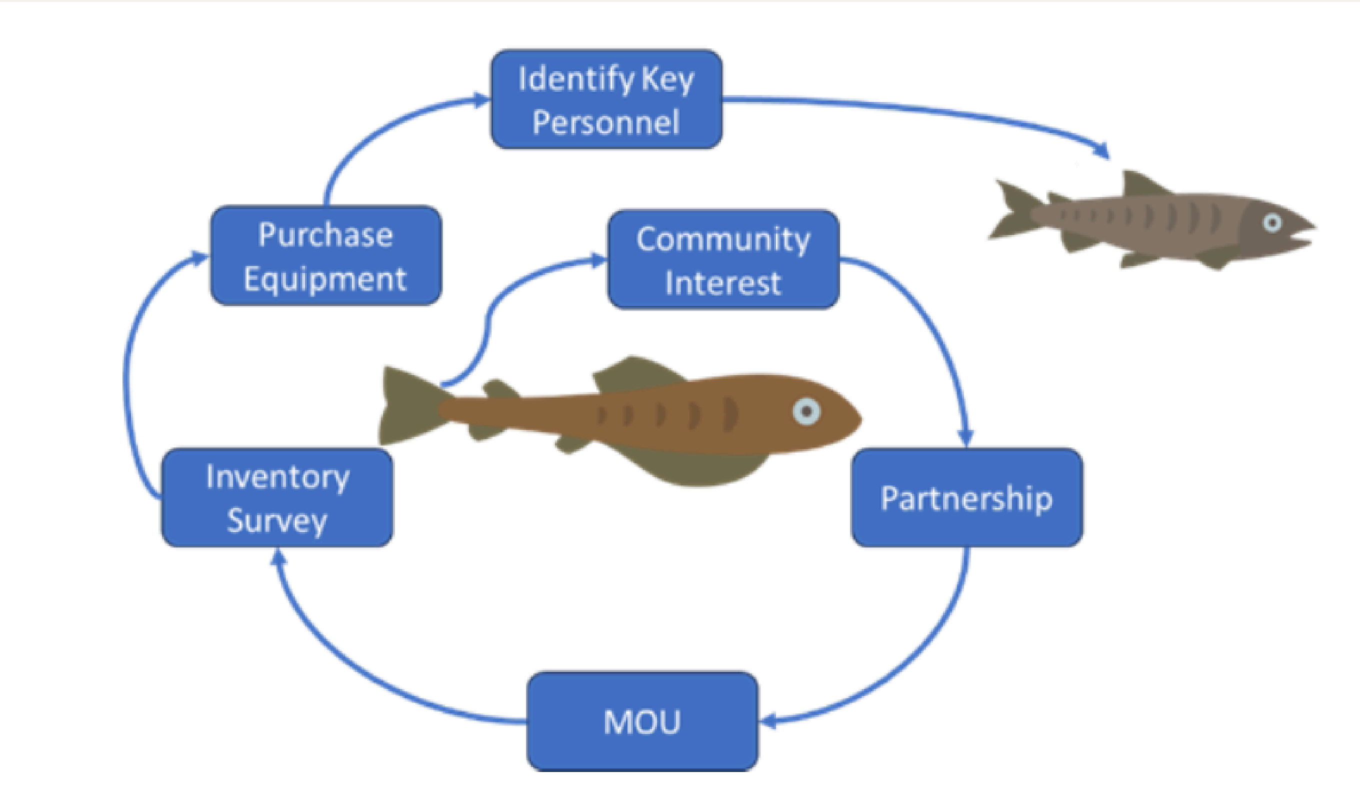


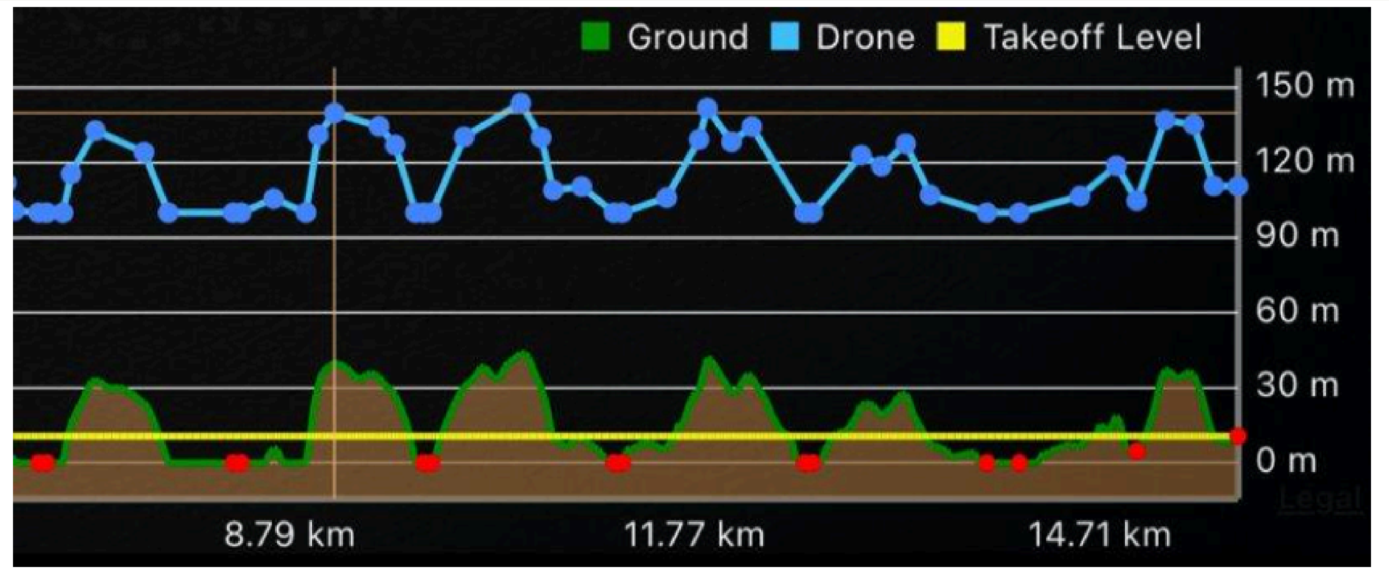
Figure 3. Flow diagram of the initial stage of a community-based salmon habitat monitoring program.

5.2 Data Collection

Following development of the program, partnerships, and relevant UAV and community mapping training, data collection and analysis can ensue. Priority sites should be identified through community mapping initiatives and can be narrowed down based on factors like urgency, feasibility of aerial surveying, and capacity constraints. Depending on site characteristics and identified priorities, two distinct types of data collection missions can be undertaken: overview data missions and habitat analysis data missions. During overview data missions, only imagery will be collected, whereas, during habitat analysis missions, imagery and additional sensor data (e.g., lidar, thermal) will be collected. In instances where datasets are to be replicated in future years, high-precision global navigation satellite systems should be used to establish ground control and validation points. Detailed instructions for UAV data collection methods can be found in the UAV Training Manual and UAV Training Videos.

5.3 Data Analysis

Once data is collected in the field, it should be processed into usable data products. Each layer of data products can be imported into QGIS and reprojected to allow for accurate overlaying of data. Data analysis methods will vary depending on which type of data (e.g., overview or habitat analysis) was collected in the field. Detailed instructions for data analysis methods can be found in the UAV Training Manual and UAV Training Videos.



5.4 Data Delivery

Data should be recorded and displayed in a way that is accessible to community members. Geospatial data can be shared both electronically (e.g., digital map) or physically (e.g., paper map). The method for sharing may correspond to the format selected for community mapping exercises or may vary across the community. Sharing progress on the information gathered through community mapping and RSHAs can help to inform additional community mapping events and may highlight new priorities or raise questions for further research.

6. Project Evaluation

Project methods and outcomes should be evaluated throughout the project and upon project completion to identify strengths, weaknesses, and lessons learned. Criteria for evaluation could include: relevance, effectiveness, efficiency, impact, sustainability & legacy, incorporation of Indigenous knowledge, best practices, and feedback from community.

These metrics will be explored further in the sections below.

6.1 Evaluating Relevance

Assessing projects for *relevance* is important as it will help infer whether or not the project should be continued or altered in future. A relevant project will be one that informs community planning and meets or contributes to priorities identified during community mapping events. A key question to consider would be:

- *Are the outputs of this project relevant to the wants and needs that community members identified during community mapping events?*

6.2 Evaluating Effectiveness

Project *effectiveness* should be evaluated to determine whether or not a project met its intended objectives. A key question to consider would be:

- *Did the project meet its intended objectives as identified through community mapping?*

6.3 Evaluating Efficiency

Evaluating project *efficiency* will be an important step, especially for First Nations that might be new to utilizing geospatial technologies. A key benefit of utilizing UAVs for RSHA is that they can ease capacity constraints through their increased survey efficiencies. In some cases, however, lengthy training and troubleshooting might result in initial inefficiencies while learning. To ensure that the project is meeting its intended efficiency purposes, consider questions like the following:

- *Did the project allow for increased efficiency in assessment (e.g., compared to traditional in-field methods)?*
- *Were there any efficiency challenges along the way (e.g., issues with data collection or processing) that might have slowed efficiency? Could these be addressed in future projects?*

6.4 Evaluating Impact

Given the costs and resources allocated to conducting a RSHA, it is imperative to evaluate the project *impacts*. This can be done by considering metrics such as project impacts for community or stewardship planning, internal capacity building, community engagement, or IK sharing or learning opportunities. In some cases, community mapping exercises might help identify the desired impacts of a project which can then be considered during evaluation. Some questions to consider when evaluating impacts would be:

- *Did the project positively impact salmon or salmon habitat?*
- *Did the project positively impact the community (e.g., through training, equipment, capacity building, Indigenous knowledge sharing, etc.)?*
- *Did the project produce any negative impacts? Can these be mitigated in future?*

6.5 Evaluating Sustainability and Legacy

Given long-term funding for environmental monitoring is often limited, communities will want to consider the *sustainability and legacy* impacts of their RSHA. While UAV equipment has a high upfront cost, once equipment and training has been conducted they can become a sustainable and efficient method for monitoring salmon habitat. Knowing what equipment, resources, and datasets are available to communities can help with future project and funding applications. Some key questions to consider when evaluating project sustainability and legacy impacts are:

- *Can the project be sustained beyond the project timeline (e.g., can monitoring or future assessments be conducted)?*
- *What legacy is left from the project (e.g., capacity built - equipment purchased, personnel trained, data collected - maps, imagery)?*
- *Will capacity built by this project be useful for other, future activities?*

6.6 Evaluating Incorporation of Indigenous Knowledge

Community mapping should provide a direct avenue for First Nations leadership and Indigenous knowledge to inform the objectives of the RSHA, but other opportunities for knowledge sharing may also exist. Evaluation of *Indigenous knowledge incorporation* could include questions such as:

- *Where was Indigenous knowledge incorporated into the project (e.g., community mapping, project design, data collection, data processing, knowledge sharing)?*
- *Was Indigenous knowledge prioritized over western-scientific methods?*
- *Did the project reflect the priorities and objectives identified by community members?*

6.7 Evaluating Best Practices

Several *best practices* exist for community mapping and RSHA methods. These best practices are outlined in the training materials, or may be identified by community members during initial planning or mapping sessions. To evaluate whether or not best practices were followed during the project, consider questions such as:

- *Were MOU's developed with project partners ahead of project work?*
- *Was Free, prior, and informed consent (FPIC) obtained?*
- *Were the First Nations Principles of Ownership, Control, Access, and Possession (OCAP) followed?*
- *Were the project objectives and methods adaptable to the wants and needs of community members?*
- *Were sessions and materials delivered in an accessible format for community members?*

6.7 Evaluating Feedback from Community

An effective way of evaluating project success is to obtain *feedback directly from the community*. This will help to identify areas that worked well, and areas that can be improved in future iterations of the project. Some key questions to ask might include:

- *How do community members feel about the work that was conducted throughout the project?*
- *Are there concerns or suggestions from community members that can be incorporated into future projects?*
- *Did community members feel that their priorities were valued and represented in the project?*

Appendix A. Example Inventory Summary

Date: ____________________

First Nation Partner: ____________________

Contact Lead: ____________________

Number of Team Members: ____________________

This project brings together geospatial technologies and community mapping methods to enhance capacity for monitoring wild salmon habitat. This survey aims to establish an inventory baseline on personnel, equipment, and data available to support capacity building for long-term salmon monitoring. The results will inform training programs in community mapping, geospatial data collection, and spatial analysis of salmon habitat data.

This information is confidential and will be used by the project team for planning purposes.

Section 1. Personnel

Please identify each participating team member and any remotely piloted aircraft (RPA) credentials obtained. *Remotely piloted aircraft (RPA) is the Transport Canada definition of aircraft platforms commonly known as UAVs or drones.

	RPA License		
Member 1:	☐ None	☐ Basic	☐ Advanced
Member 2:	☐ None	☐ Basic	☐ Advanced
Member 3:	☐ None	☐ Basic	☐ Advanced
Member 4:	☐ None	☐ Basic	☐ Advanced
Member 5:	☐ None	☐ Basic	☐ Advanced

Please provide each member's familiarity with geospatial data or methods on a scale of 1 through 5, with 1 being "No prior knowledge/fresh start" and 5 being "proficient with geospatial data, software, and workflows."

	1	2	3	4	5
Member 1:					
Member 2:					
Member 3:					
Member 4:					
Member 5:					

Please rate the following items on a scale of 1 through 5, with 1 being "strongly disagree" and 5 being "strongly agree."

Our team currently employs a variety of geospatial technologies to support various projects. 1 □ 2 □ 3 □ 4 □ 5 □

Our team is familiar with Remotely Piloted Aircraft data collection.
1 □ 2 □ 3 □ 4 □ 5 □

Our team is familiar with GPS/GNSS data collection.
1 □ 2 □ 3 □ 4 □ 5 □

Our team is familiar with Geographic Information Systems (GIS).
1 □ 2 □ 3 □ 4 □ 5 □

Section 2. Equipment

Please answer the following questions about equipment availability and experience for your team.

1. Does the team currently have access to an RPA? □ Yes □ No

2. If yes, please list aircraft that are available:

____

____

____

____

3. Please check sensor types available:

☐ Camera - RGB
☐ Camera - Multispectral
☐ Camera - Thermal
☐ LiDAR

4. Does the team have experience with an RPA? ☐ Yes ☐ No

5. If yes, please list aircraft used:

____

____

____

____

6. Please check sensor types used:

☐ Camera - RGB
☐ Camera - Multispectral
☐ Camera - Thermal
☐ LiDAR

7. Does the team currently have access to GPS/GNSS? ☐ Yes ☐ No

8. Please check systems used:

☐ Handheld GPS/GNSS (~3m accuracy)

☐ Differential GPS/GNSS (~0.5m accuracy)

☐ Real Time Kinematic GPS/GNSS (~0.01m accuracy)

Please answer the following questions about digital infrastructure and experience for your team.

1. Please list the specs of the best available computer for geospatial processing:
   Operating System:
   Memory (RAM):
   CPU:
   Video Card:
   Hard Drive space:

2. Does the team have capacity to view/manage geospatial data? ☐ Yes ☐ No

3. Does the team have access to RPA data processing software? ☐ Yes ☐ No

4. If yes, please check software available: Pix4d ☐ Agisoft ☐ DJI Terra ☐ Other ☐

5. Has the team used RPA data processing software? ☐ Yes ☐ No

6. If yes, please check software used: Pix4d ☐ Agisoft ☐ DJI Terra ☐ Other ☐

7. Does the team have access to GIS software? ☐ Yes ☐ No

8. If yes, please check software available: Google Earth ☐ QGIS ☐ ESRI ☐ Other ☐

9. Has the team used GIS software? ☐ Yes ☐ No

10. Please check software used: Google Earth ☐ QGIS ☐ ESRI ☐ Other ☐

Section 3. Community Mapping

Community Mapping is a participatory tool that has been used to engage the historical, physical, social, cultural, and even spiritual attributes of a community and its relationships to the environment. This approach enables people to affirm and bring together their knowledge and experience about a place that can inform collective visioning for community and ecological planning.

Please answer the following questions about your experience with community mapping.

1. Has your team been involved with community mapping in the past? ☐ Yes ☐ No

2. If yes, please briefly describe the project:

____

____

____

____

3. Does your team have experience with recording sites of cultural significance? ☐ Yes ☐ No

4. If yes, does a member of your team manage community mapping data? ☐ Yes ☐ No

Section 4. Data

Please answer the following questions regarding data pertaining to salmon habitat monitoring.

1. Does your team have existing spatial data related to salmon habitat monitoring? ☐ Yes ☐ No

2. If yes, please describe the types of data:

____

____

____

____

3. Does your team have salmon fishery related data (i.e., fish counts)? ☐ Yes ☐ No

4. If yes, please describe the types of data:

____

____

____

____

____

Please list the team's salmon species of interest:

Any other information to share that is meaningful to this project please do so here:

Thank you for completing the survey.

Appendix B. Example of Equipment to Purchase

Section 1: Remotely Piloted Aircraft

This section is to summarize the decision-making process for the evaluation and purchase of RPA equipment for each partner.

1. Key Equipment List.[1]

Equipment	Number of Units	Supplier	Purchased
DJI M300 RTK - Combo SP Plus	4	DJI	Y
DJI Zenmuse H20T Thermal Sensor	4	DJI	Y
DJI Zenmuse P1 Photogrammetric Sensor	4	DJI	Y
DJI Zenmuse L1 LiDAR Sensor	4	DJI	Y
TB60 Intelligent Flight Battery	16	DJI	Y
Pelican Cases	9	Pelican	N
DJI Terra Overseas Perpetual License	4	DJI	Y
Field Processing Laptop	4	ASUS	Y

2. Summary of the Decision-Making Process

The DJI M300 RTK airframe was chosen as it is the newest developed platform by DJI. The DJI series of airframes offer turnkey solutions that will work with multiple sensor units. Additionally, the sensor units from DJI come already integrated making their implementation more accessible to users without expert knowledge.

[1] Additional equipment may also be required depending on the project goals and pre existing resources. It is recommended that full, project-specific equipment lists be developed during the planning and budgeting stage.

Section 2: Global Navigation Satellite Systems

This section is to summarize the decision-making process for the evaluation and purchase of GNSS equipment for each partner

3. Detailed List of Equipment.

Equipment	Number of Units	Supplier	Purchased
D-RTK 2 GNSS Mobile Station	4	DJI	Y
D-RTK Base Station Tripod	4	DJI	Y
SD-85 GPS Rover/Base	3	Spectra Precision	Y

4. Summary of the decision-making process

The DJI RTK mobile station is the latest GNSS receiver produced by DJI for integration with the M300 airframes offering improved accuracy locations for flights and data collection. The spectra Precision rover and base GNSS receivers were selected as they offer high-quality positioning data for the collection of ground control locations and other points of interest at a price that allows for each First Nation partner to have their own system.

Section 3: Other Equipment

This section is to summarize the decision-making process for the evaluation and purchase of RPA equipment for each partner.

5. Detailed List of Equipment.

Equipment	Number of Units	Supplier	Purchased
Ground Control Targets	3	Sky High Bull's Eye	N
ICOM A25c Airband VHF Radio	3	ICOM	N
Field Tent	3	Coleman	N
Field Table	3	Woods	N
Equipment Cart	3	Yardworks	N
Landing Pad	3	Hoodman	N
Go Pro Hero 9	3	GoPro	N
Generator	3	Honda	N
Office Desktop Computer	3	Dell	N

6. Summary of the Decision-Making Process

The flight support equipment was chosen to aid in mission deployment. The air band radio is a recommendation by Transport Canada in the event direct communication with air traffic control is needed. Other equipment was chosen based on knowledge from UVic Map Shop experience during past UAV missions. A variety of suppliers were chosen to seek the best available prices for needed equipment.

Appendix C. Memorandum of Understanding Template

<PROJECT TITLE>
COLLABORATIVE PROJECT MEMORANDUM OF UNDERSTANDING

BETWEEN:

Partner/Organization 1 (Name, organization type, office address)

AND:

Partner/Organization 2 (Name, organization type, office address)

AND:

(Add additional partner/organizations as needed)

BACKGROUND:

A. Description of Partner/Organization 1

B. Description of Partner/Organization 2

C. Description of Partner/Organization X

D. Background on project origin (e.g., project purpose 1-2 sentences)

E. Background on project funding (e.g., how is project being funded, what agreements are in place)

F. Statement of partner roles (e.g., are all partners equal partners? Are some only involved for certain aspects of the project?)

G. Statement of intent (e.g., the parties to this Agreement wish to…)

THE PARTIES AGREE AS FOLLOWS:

1. DEFINITIONS

1.1. In this Agreement:

1.1.1. "TERM" means ….

1.1.2. "TERM 2" means...

(In this definition section, it is good to define things like: contract period, confidential information, data, Indigenous Knowledge, etc.)

2. PROJECT

- In this section, highlight how the project will be managed (e.g., Who makes decisions, is there a committee?).
- Outline how Parties are expected to adhere to the contribution agreement.
- Outline the process for invoicing.
- Outline the process for reporting.

3. OBLIGATIONS OF PARTIES

- Outline the obligations of each party. Consider how principles like OCAP, FPIC, and respect are to be followed.

4. CONFIDENTIALITY

- Outline expectations for non-disclosure of confidential information.
- Outline expectations for return of confidential information upon end of contract period.
- Outline expectations for obtaining and recording consent from Indigenous community members of the Nation(s) who share data during the project.

5. PUBLICATION OF RESULTS (if applicable)

- Include information regarding proposed publication of results , objection to proposed disclosure, and co-authorship.

6. RETENTION OF DATA, RESULTS and FINAL DELIVERABLES

- Outline expectations for copies of data, results, and deliverables for each Party. Who will get copies of the data and final deliverables? What information will need to be redacted?
- Outline expectations for how copies of data should be sent to the Nations that were involved in the project.
- Outline how data, results and final deliverables may be used by the Parties.

7. TERMINATION

- Outline when this Agreement will terminate (e.g., at the end of the contract period, upon termination of other agreements, by a material breach).
- Provide a statement regarding termination and its failure to release Parties from their rights and obligations under Articles 4 (Confidentiality), 5 (Publication of Results), and 6 (Retention of Data, Results and Final Deliverables).

8. NOTICES

- Outline contact persons and how notices are to be delivered to each of the Parties (below).

To PARTY 1:
NAME(S), ROLE, ORGANIZATION
MAILING ADDRESS
PHONE NUMBER

To PARTY 2:
NAME(S), ROLE, ORGANIZATION
MAILING ADDRESS
PHONE NUMBER

To PARTY X:
NAME(S), ROLE, ORGANIZATION
MAILING ADDRESS
PHONE NUMBER

9. GENERAL

- Additional clauses regarding the agreement, as needed.

Execution Page Follows

SIGNED FOR AND ON BEHALF of
<PARTY 1> by its duly authorized signatory:

____
Name:
Title:
Date:

SIGNED FOR AND ON BEHALF of
<PARTY 2> by its duly authorized signatory:

____
Name:
Title:
Date:

APPENDICES

Include any relevant appendices (e.g., Terms of Reference, Consensus Procedures, etc.)

Glossary

GIS: Geographic Information System, a computer system for collecting, storing, viewing, and analyzing geospatial information.

GNSS: Global Navigation Satellite Systems, a navigation system that can utilize multiple constellations of satellites (GPS (USA), GLONASS (Rus), Galileo (EU)) for positioning information.

GPS: Global Positioning System, a satellite-based platform for navigation operated by the USA, is one of several global navigation satellite systems.

RPA: Remotely Piloted Aircraft, Transport Canada's definition for small (250g < 25kg) aircraft commonly known as drones or Unmanned Aerial Vehicles (UAVs).