

***Implementation of a Bird
Banding Program at
Wildlife Haven Rehabilitation
Centre in Southern Manitoba***

A Practicum

*Submitted to the Faculty of Graduate Studies of the
University of Manitoba in Partial Fulfilment of the
Requirements of the Degree of*

Master of Natural Resources Management

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Abstract

This practicum project was the implementation of a bird banding program at Wildlife Haven Rehabilitation Centre. The organisation identified the need to develop a monitoring program to track avian patients post-release in order to better assess patient survivability. This project resulted in multiple deliverables, including the permits needed for Wildlife Haven to band birds; a comprehensive bird banding protocol for Wildlife Haven Rehabilitation Centre which they can use in the bird banding pilot program in partnership with Delta Marsh Bird Observatory; a suggested draft agreement between Wildlife Haven and Delta Marsh outlining each organisation's roles in the program and how each partner will achieve their goals together was completed; and an in-depth research paper examining the role of wildlife rehabilitation in conservation and how the data from these centres can produce valuable research for the wildlife community.

Acknowledgements

These last two and a half years have been wildly challenging in ways I could not have imagined. To be completing my Master's after three years is an accomplishment I am extremely proud of, but I could not have done it alone.

I would like to start by first thanking my advisor, Dr. Nicola Koper. Without your support, patience and encouragement, I surely would not have completed this degree. You have the uncanny ability to make me feel like I can accomplish anything, even when I have been at my lowest. Any student would be lucky to have an advisor or professor who is even half as motivating and supportive as you are.

To my committee: Dr. Kevin Fraser, Sheldon McLeod and Zoe Nakata. I thank you for your guidance and excitement for this project. You helped spark a light of inspiration to work towards the finish line of my adjudication. You all brought your own area of expertise to this project and I am forever grateful to your contributions.

I would be remiss to not thank my fellow Natural Resources Institute peers and professors. While we were sent down different paths due to Covid-19, I cherish each moment of comradery, brainstorming, and the thought-provoking discussion we have shared during our short time on campus together. The NRI family is a joy to be a part of.

To my friends and family that persevered and experienced every moment of self-doubt and frustration right along with me: thank you. For all the dinners, long winter walks, extended advisory phone calls and sunroom karaoke breaks. To Casey, Janelle, Jeremie, Alex, Kendra, Patrick, Becca, Sheena, and Alix, from the bottom of my heart, I thank you. I love you all so much.

Dedication

To my parents, Patricia and Sandy. You always knew how to push me just enough to achieve my goals. I am lucky to forever receive your unconditional love and support. I love you both.

List of Abbreviations

CMMN - Canadian Migration Monitoring Network

DMBO - Delta Marsh Bird Observatory

HPAI - Highly Pathogenic Avian Influenza

OHM - Oak Hammock Marsh

WNV - West Nile Virus

WHRC - Wildlife Haven Rehabilitation Centre

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Chapter 1: Integrated Project Plan

The Integrated Project Plan is the initial proposal to establish the need for a banding program at Wildlife Haven Rehabilitation Centre and to define the relationships, roles, and expectations of the stakeholders. It is written in past tense as it was created as the project proposal and introduction to the purpose of the banding program. Any relevant changes or diversions from what was discussed in the Integrated Project Plan will be addressed in the Activity List, Milestone Chart, Change Log and Chapter 5 of this document.

EXECUTIVE SUMMARY

The objectives of this project are to:

1. To create a formal partnership between Wildlife Haven Rehabilitation Centre and Delta Marsh Bird Observatory to band and track avian patients post-release.
2. To develop a bird banding program protocol for Wildlife Haven

Wildlife Haven Rehabilitation Centre is a wildlife hospital that has cared for over 50,000 animals since its inception in 1984. As a registered charitable organisation it relies on its community of donors and volunteers to operate. The Centre was recently accredited as a wildlife hospital in the summer of 2021 and welcomed its first full-time veterinarian to its staff. This, along with the experience and knowledge of a sophisticated rehabilitation team, has resulted in better patient outcomes for the wildlife that has come into care. As a crucial pillar in the conservation community of Manitoba, Wildlife Haven is looking to expand its contributions to scientific research and learn more about how they can improve their patient outcomes through a developed monitoring system post-release. With over 600 birds released in 2021 alone, the potential for learning from the knowledge gained through banding patients is substantial.

Delta Marsh Bird Observatory has been in operation as a banding research post since 1992 and continues to be the sole Manitoban organization in the Canadian Migration Monitoring Network. It operates out of Oak Hammock Marsh in connection with the Harry J. Enns Wetland Discovery Centre, a hot-spot convergence of birds bi-annually in

their migratory corridor. Headed by Paula Grief, the Resident Naturalist at the Oak Hammock Marsh Interpretive Centre, the program is looking to expand their banding potential.

This project has brought these two organisations together to form a partnership to develop an ongoing banding program that will aim to monitor avian patients post-release from their care at Wildlife Haven. Banding birds is a valuable tool in the research community. It can reveal population data about where certain species are found, avian life cycles, migratory patterns, bird behaviour and the overall health of a population, for example. In the long term, this data will help provide Wildlife Haven with insight to further develop their avian rehabilitation program and answer questions about whether their patients are migrating, mating and foraging as they naturally should once returned to the wild. The program will elevate Wildlife Haven's stature in the research and conservation community both within Manitoba and beyond.

This project has resulted in multiple deliverables, including the permits needed for Wildlife Haven to band birds, a comprehensive bird banding protocol for Wildlife Haven Rehabilitation Centre which they can use in the bird banding pilot program in partnership with Delta Marsh Bird Observatory. A draft agreement between Wildlife Haven and Delta Marsh outlining each organisation's roles in the program and how each partner will achieve their goals together was completed. An in-depth research paper examining the role of wildlife rehabilitation in conservation and how the data from these centres can produce valuable research for the wildlife community is included in this document as well.

This integrated project plan includes a comprehensive assessment of how the objectives were met by establishing a plan for producing high-quality deliverables that meet the standards of interested parties. The Project Charter introduces the business justification and roles and responsibilities of interested parties. The Project Scope dictates the deliverables and project requirements that were needed to produce deliverables. It also outlines the boundaries of cost, time, and resources needed in the

project. I will discuss the skills and experience that were necessary to the success of this project. Potential risks associated with this project were evaluated and addressed in a risk response plan. The projected completion date of August 2022 is achievable as demonstrated in the included timeline; any potential delays have been addressed in the risk response plan as well. The plan, as a whole, is composed of components that address specific aspects of the project such as budget, resource requirements, a timeline, and a plan for risk mitigation, quality assurance, and promotion plan. The budget and resource requirements highlight any costs associated with the success of the project. The quality assurance section includes the protocols and limitations that the project must abide by in order to be considered successful. It explains how I plan to manage quality expectations throughout the project timeline. The promotion plan dictates the pathways of communication throughout the project and how the banding program will be introduced to the staff, volunteers, and community that supports Wildlife Haven. The appendices include supporting documentation and charts that correspond to the main body of the project plan. There, you will find a Background Information Report that outlines the benefits of a banding program at a wildlife rehabilitation facility, describes the meeting process for the development of the agreement between Wildlife Haven and Delta Marsh, and discusses the scope of the research paper.

PROJECT CHARTER

I. General Information

Project name: Implementation of a Bird Banding Program at Wildlife Haven Rehabilitation Centre

Project organiser: Kathryn Gibb

II. Project Overview

The outcome of this project will be an on-going banding program at Wildlife Haven Rehabilitation Centre in partnership with Delta Marsh Observatory to monitor avian patient survival post-release to ensure that patients have returned to their natural behaviours. Conservation is a pillar of Wildlife Haven's mission and by banding avian patients we can contribute greatly to research and conservation efforts in Manitoba. We aim to use the information to better our rehabilitation practices, promote the value of wildlife rehabilitation to our community, and enhance the Centre's role as a contributing member of the scientific community. As a member of the management team at Wildlife Haven, I will be in a position to develop this program on-site while keeping the needs of all stakeholders in mind.

III. Project Objectives

The goal of this project is to establish a long-term banding program at Wildlife Haven Rehabilitation Centre beginning in the Spring of 2022 in order to gain information to improve rehab practices and to enhance the Centre's role in the scientific community.

A. To create a formal partnership between Wildlife Haven Rehabilitation Centre and Delta Marsh Bird Observatory to band and track avian patients post-release.

B. To develop a bird banding program protocol for Wildlife Haven

IV. Business Justification

Banding avian patients will contribute greatly to the population data of birds in Manitoba. As a wildlife rehabilitation centre, we are constantly working towards improving patient outcomes and an integral part of that is ensuring that patients are rehabilitated effectively to resume their natural behaviours post-release. This

data will not only be helpful to the scientific community but could also help Wildlife Haven prove their worth as a leader in the conservation community of Manitoba. Manitoba is home to 13 endangered bird species, with an additional nine avian species listed as threatened. The science of wildlife rehabilitation has the potential to positively impact the survival of endangered or threatened species if brought into our care. It is important to assess whether patients are simply surviving or if they are thriving post-release from the rehabilitation centre; this can help justify the cost of rehabilitation processes, help judge whether to change certain rehabilitation protocols and prove the worth of releasing rehabilitated wildlife back into the wild. It is important to prove the benefit of Wildlife Haven's work to the community of government officials, scientists and donors that support our work.

V. Resource Costs and Estimates

The cost of this project will be internalised by Wildlife Haven. The banding permit will be connected to that of Delta Marsh Observatory's existing permit and will come at no extra cost to either party, nor will the banding materials themselves. Any available data on the banded birds will always be provided free of charge from the North American Bird Banding Program. The labour of my work will be paid for by Wildlife Haven as a part of my employment salary.

VI. Roles and Responsibilities

Interested Party	Role	Responsibilities
Kathryn Gibb	Grad student and Project Manager	Develop and execute project plan. Responsible for communication between project partners.

<p>Dr. Nicola Koper</p>	<p>Professor, Associate Head Natural Resources Institute, University of Manitoba <i>Student's Advisor</i></p>	<p>Guide the overall process of the project. Act as project resource. Sign off on all practicum progress documents. Sit on MNRM practicum committee.</p>
<p>Zoe Nakata</p>	<p>Executive Director, Wildlife Haven Rehabilitation Centre <i>Official project partner and committee member</i></p>	<p>Guide project direction. Oversee the development of documents, including permit. Ensure Wildlife Haven's needs are met. Sign off on all FGS documents. Sit on MNRM practicum committee.</p>
<p>Paula Grief</p>	<p>Resident Naturalist, Oak Hammock Marsh Interpretive Centre <i>Official project partner</i></p>	<p>Act as project resource. Submit Scientific Permit to Capture and Band Migratory Birds. Provide banding materials and expertise. Bands birds.</p>
<p>Dr. Kevin Fraser</p>	<p>Associate Professor, Avian Behaviour and Conservation Lab, University of Manitoba <i>Committee member</i></p>	<p>Guide project direction. Act as project resource. Sit on MNRM practicum committee.</p>

Sheldon McLeod	Adjunct Professor, Natural Resources Institute, University of Manitoba <i>Committee member</i>	Guide project direction. Act as project resource. Sit on MNRM practicum committee.
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PROJECT SCOPE STATEMENT

I. General Information

Project name: Implementation of a Bird Banding Program at Wildlife Haven Rehabilitation Centre

Project organiser: Kathryn Gibb

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VII. Project Objectives

The goal of this project is to establish a long-term banding program at Wildlife Haven Rehabilitation Centre beginning in the Spring of 2022 in order to gain information to improve rehab practices and to enhance the Centre's role in the scientific community.

- A. To create a formal partnership between Wildlife Haven Rehabilitation Centre and Delta Marsh Bird Observatory to band and track avian patients post-release.
- B. To develop a bird banding program protocol for Wildlife Haven

IV. Comprehensive List of Project Deliverables

- A. Scientific Permit to Capture and Band Migratory Birds and Abbreviated Protocol for Minimal Animal Involvement form allowing Wildlife Haven to band birds granted in January 2022.
- B. Banding protocol and procedures documents in conjunction with Paula Grief and Zoe Nakata by April 2022.
- C. Draft partnership agreement between Wildlife Haven and Delta Marsh Bird Observatory by April 2022.
- D. Research paper researching why banding is necessary within the scope of wildlife rehabilitation by June 2022.

V. Comprehensive List of Project Requirements

- A. Scientific Permit to Capture and Band Migratory Birds and Abbreviated Protocol for Minimal Animal Involvement form allowing Wildlife Haven to band birds granted in January 2022.
 - a. Include the scope of banding program goals of Wildlife Haven.
 - b. Are effective immediately.
 - c. Are approved by Zoe Nakata and meet Wildlife Haven's needs.
 - d. Are submitted by Paula Grief, December 2021.
 - e. Can be renewed annually.
- B. Banding protocol and procedures document in conjunction with Paula Grief and Zoe Nakata by April 2022.
 - a. Follow Wildlife Haven animal care protocols.
 - b. Follow the Provincial Permit to Operate regulations that Wildlife Haven operates within.
 - c. Follow the Bander's Code of Ethics and guidelines within the North American bird banding manual.
 - d. Follow regulations laid out in the Scientific Permit to Capture and Band Migratory Birds.
 - e. Follow any stipulations designated by the Abbreviated Protocol for Minimal Animal Involvement form.

- f. Are presented as simply and succinctly as possible to not leave any room for confusion or interpretation.
- C. Draft partnership agreement between Wildlife Haven and Delta Marsh Bird Observatory by April 2022.
 - a. Achieves the monitoring goals of Wildlife Haven.
 - b. Are tentatively accepted by both parties.
 - c. Can take effect before the Summer of 2022.
 - d. The terms of the agreement will allow for the collection of meaningful data
- D. research paper researching why banding is necessary within the scope of wildlife rehabilitation by June 2022.
 - a. Explains the necessity for wildlife rehabilitation centres.
 - b. Explains the role banding programs play in population and ecological studies.
 - c. Explains the role that a wildlife rehabilitation centre can play in the conservation of wildlife, and how banding can contribute to such research.

VI. *Exclusions from Scope*

This project will not incorporate any direct tracking methods within the scope of the monitoring program. Because banding birds will be a pilot project for Wildlife Haven, we are opting to only band songbirds to start so as not to stretch our resources too thin. As a non-profit that operates only on donor funding, we have limited resources and cannot afford to assign too many people to one project at a time. In addition, the bands for waterfowl or raptors require training, experience, and more complicated banding equipment. Down the road, Wildlife Haven will explore the possibility of implementing direct tracking technologies or variations of colour-bands to track patient post-release, in addition to expanding the program to include a broader range of species.

VII. *Resource and Cost Estimates*

The current estimated cost of this project is \$1200. This cost accounts for the tuition costs that will be paid during the duration of the project. It will be paid for

by private funds. While the time and effort put in by interested parties is acknowledged, those asked to take part in the committee or as project partners will not be paid for their time committed to this project. It is estimated that each committee member will donate roughly 15 hours between meetings, reading the practicum documents, and the final adjudication. The banding equipment will be provided by Delta Marsh Bird Observatory in kind.

VIII. Assumptions

I am continuing in the planning of this project assuming the following things:

- A. Wildlife Haven gets permit to band birds.
- B. There will be releasable avian patients to band.
- C. Banding will take place on site at Wildlife Haven.
- D. Wildlife Haven and Delta Marsh Bird Observatory can agree to terms laid out in a draft partnership agreement.
- E. Once the final project is delivered, Wildlife Haven and Delta Marsh Bird Observatory will continue their partnership in banding birds.

IX. Project Acceptance Criteria

This project will be considered complete once the banding protocol document and formal agreement have both been approved by Wildlife Haven Rehabilitation Centre and Delta Marsh Bird Observatory. If the requirements listed in the project scope document are met, then this project should be considered acceptable.

I will commit to creating a thorough banding program protocol and draft agreement for both Wildlife Haven and Delta Marsh Bird Observatory. However, as the program progresses beyond the extent of this project, those documents may change overtime. Both documents must be written with the intent of further changes being made to the program after the completion of this project.

X. Constraints

Timeframe: 5 months

Project Partner needs: Wildlife Haven and Delta Marsh Bird Observatory have similar goals in mind for the program, but will have their own requirements for the draft agreement. It is unlikely there will be any conflict but if there are any disagreements, they could shift the timeline of this project plan.

XI. Scope Management Plan

My intention is to communicate effectively with the interested parties to ensure that they are informed of any potential changes to the project plan should they arise. Wildlife Haven is an actively growing organization whose needs and requirements shift over time. The scope could be modified following the first committee meeting in February with Zoe Nakata, Nicola Koper, Kevin Fraser and Sheldon McLeod. Ultimately, the scope will be dictated by Zoe Nakata as she is the Executive Director of Wildlife Haven. She will assess the needs for Wildlife Haven and therefore, the goals and parameters of the banding program. I will first meet with Paula Grief one on one to ensure that our goals are aligned and that the scope of the banding program is manageable as Delta Marsh will be providing the banding training and supplies. Following that, I will then meet with both Paula and Zoe to go over the draft agreement, making any necessary changes to the document and scope of the banding program that come up within that meeting. I will be flexible in any changes that are requested by the project partner and ensure that Delta Marsh can accommodate the requests, or vice versa.

RESOURCE AND COST ESTIMATES

The estimated cost of this project is \$1200. This cost accounts for the tuition costs that will be paid during the duration of the project. It will be paid for by private funds. While the time and effort put in by interested parties is acknowledged, those asked to take part in the committee or as project partners will not be paid for their time committed to this project. It is estimated that each committee member will donate roughly 15 hours between meetings, reading the practicum documents, and the final adjudication. The banding equipment will be provided by Delta Marsh Bird Observatory in kind.

Resource Group	Item	Source	Cost
Tuition	Kathryn Gibb	Private	\$1200 CAD
Time		Committee Members	15 hours
Equipment	Banding Materials	DMBO	\$150
Unforeseen	Unforeseen Expenses	Wildlife Haven	\$500 CAD

Descriptions

I. Tuition Cost - \$1200

A. This cost is to be covered by the Project Manager. It represents the tuition of Winter and Summer semester costs as provided by the University of Manitoba.

II. Time - 15 hours

A. This is to acknowledge the generous time each committee member will have donated to this Practicum process.

III. Equipment - \$150

- A. The equipment will be provided by DMBO in kind. The bands provided by the Canadian Bird Banding Office are given free of charge. The banding pliers, leg gauge and scale will be brought by the Master Bander.

IV. Unforeseen Expenses - \$500

- A. This is to account for any unforeseen costs that may arise. These may include unanticipated costs for labour in overtime for the Project Manager, costs of banding materials or travel costs for meetings between parties.

RESOURCE REQUIREMENTS and PROCUREMENT

This details the resources that will be required to complete the objectives and deliverables of this project. This table will demonstrate the resources that may or may not be necessary to complete this project. It is built upon a close examination of the Activities List, Skills Inventory and Materials, Supplies and Equipment list.

Task	Materials Needed	Available/Procure	Approximate Cost
Retrieve & fill out permit forms	Scientific Permit to Capture and Band Migratory Birds forms, Abbreviated Protocol for Minimal Animal Involvement form	Available through Paula Grief & online	\$0
Research bird banding Code of Ethics	Banding Code of Ethics	Available online	\$0
Research animal care protocol of Wildlife Haven	Animal Care Protocol	Available at Wildlife Haven	\$0
Research bird banding protocol of Delta Marsh	Banding protocol from Delta Marsh	Available through Delta Marsh Observatory	\$0
Conduct research paper	Access to JSTOR, Nature and other academic databases	Available through university	\$0

SKILLS and KNOWLEDGE ACQUISITION PLAN

This plan requires the need for many soft skills as opposed to technical or physical skills. This segment is based on the Responsibility Assignment Matrix and Skills Inventory.

Writing

The main skill required for this project will be written communication, whether that is through email exchanges, permits, the draft agreement, banding protocol or the research paper. A great challenge for any writer of a project proposal is to be able to convince the reader of the worth of the project but to do so succinctly. My experience in the MNRM masters program has helped improve my writing skills through the assignments and analyses it has required of me. They varied in word requirements and it can be more difficult to stay within those parameters depending on the subject matter.

I have been in the workforce for 8 years now and have always received positive feedback on my written communication skills. The exercise in writing this project proposal will set me up for success with regards to the final practicum document.

Research

Similar to writing, there will be an abundance of research required in this project. I have sourced many of the required documents for the banding protocol, but will have to tap into my acquired research skills for the research paper. In depth research can consist of an abundance of sources: organizing and utilizing only the necessary parts of the research will be helpful here. I have learned through the Qualitative Methods course as part of the MRNM requirements strategies in using sources deliberately and productively, while not dwelling too much on aspects of a source that are not relevant to your needs. With regular feedback from the project partner, Zoe Nakata, and my advisor, Nicola Koper, I believe this will be refined continuously throughout the project's timeline.

RISK MANAGEMENT PLAN

This project is overall a very low-risk undertaking. The project activity with the greatest risk falls directly at the beginning: acquiring the permit to band birds at Wildlife Haven. However, with the expert guidance of Paula Grief, I do not anticipate this permit to be rejected. I believe with a solid project plan, well-thought out deliverables and requirements, and clear communication, all risks can be mitigated. The following table lays out the risk response plan to the main risks of the project.

sk #	Risk	Response	Details
1	Wildlife Haven does not get approved for the Scientific Permit to Capture and Band Migratory Birds.	Avoid, Mitigate	While this would be a set-back for the banding program to begin in 2022, the project deliverables could be altered to reflect the delay in banding permit approval. Wildlife Haven could re-apply or mitigate any outstanding issues in our applications.
2	The Project Plan does not get approval for the Abbreviated Protocol for Minimal Animal Involvement form.	Mitigate	I could follow any stipulations they provide in the denial feedback and reapply with the corrections in place.

3	Wildlife Haven and Delta Marsh Observatory cannot agree on details of the agreement	Mitigate	While it can be difficult to get multiple parties to agree to a set of terms, I believe that Wildlife Haven and Delta Marsh have similar enough interests that any disagreement during the planning process can be resolved with further discussion.
4	Banding program initiation is delayed due to unforeseen circumstances	Accept, Mitigate	With Covid-19 playing a role in many aspects of life recently, it is likely to assume that Covid-19 could interfere with the development of this project by delaying scheduled meetings or preventing the banding program from beginning due to maximum room capacity in the exam room. While these will be unavoidable, I do not think they will prevent the project from going forward. In-person meetings can be rescheduled virtually. The project can still be completed and accepted without the banding program actually having begun. If the program is delayed a year or a season due to Covid restrictions, that will not impact the success of the project deliverables and requirements.

5	Avian flu halts all bird handling in province	Accept	There has been an avian flu detected in Eastern Canada that has impacted wildlife rehabilitation centres in Nova Scotia. We are monitoring the situation closely. While this will not impact the project portion of this Master's practicum, it could prevent the banding program from beginning this spring.
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QUALITY MANAGEMENT

This section details the standards of quality this project will have to abide by including any existing policies, standards or regulations put in place by the Masters Practicum Program Requirements or a Project Partner. This section defines quality management procedures to be adhered to as the planning process evolves.

I. Quality Standards and Regulations

- A. Wildlife Haven Rehabilitation Centre abides by its permit to operate put in place by the Province of Manitoba. This permit, along with Wildlife Haven's own Animal Care Protocol, will dictate the standards of animal care found within the Bird Banding Protocol deliverable document. Guidelines set out by the Scientific Federal Permit to Capture and Band Migratory Birds will also inform the Bird Banding Protocol document.
- B. Delta Marsh Observatory has a bird banding protocol in place which will dictate the protocol developed for Wildlife Haven as well. Paula Grief has already given permission to use their protocol to aid in developing the protocol for Wildlife Haven.

II. Quality Criteria

- A. Project must be completed by August of 2022.
- B. Project must meet the deliverable requirements set out in the Charter.
- C. Bird banding protocol must match the standards of care found in Delta Marsh Observatory's existing banding protocol.

III. Quality Assurance Procedures

- A. Procedural and regular checks to ensure quality.
 - 1. Revisiting the Activity List, Milestone Chart and RACI chart will help to ensure the project stays organized and is continuing at the necessary pace.
 - 2. I will ensure quality by comparing the Activity List with the Timeline to ensure that things are being done on schedule. I will have the timeline printed out and visible at my work desk daily.
 - 3. The Wildlife Haven Management team holds weekly meetings to check in on the team's ongoing projects. This will be a space in

which I am held accountable by Wildlife Haven to meet project deadlines.

- B. Feedback will be given by Zoe Nakata, Project Partner, as the deliverable documents are developed. Because I am an employee at Wildlife Haven, I will have to submit documentation to her before submitting it for review as part of the practicum requirements. This will ensure that Wildlife Haven's needs are met at every phase of the project.
- C. I will prioritize revisiting the project plan as a way to continually maintain focus and keep a log of any edits made to the plan as it unfolds.

IV. Quality Management Roles and Responsibilities

- A. I will take full responsibility for the quality management of this project. I have completed a Research and Integrity Course as part of the MRNM requirements and it is up to me to uphold those research standards in my practicum project.
- B. The Project Partners (Wildlife Haven and Delta Marsh) must communicate their standards of quality to me when we meet to discuss their needs and goals in this project.
- C. My committee will ensure that the quality of my work meets the criteria of the MRNM graduate program requirements.

COMMUNICATIONS PLAN

The communications plan breaks down the methods and strategy behind the necessary communication with interested parties for the entirety of the project. It includes what information needs to be communicated and how it will be done. This chart is subject to change and any changes will be included in an Activity Log.

Because I work at Wildlife Haven and have regular, daily contact with Zoe Nakata, I will need to ensure that any discussions regarding the banding program and this Masters practicum will be logged as well. I will create a shared document with Zoe Nakata and Nicola Koper so they can monitor progress along with me, as well as amend and add to any meeting notes as they see fit.

Communication	Recipients	Method	Timing	Responsibility
Scientific Permit to Capture and Band Migratory Birds form	Paula Grief	Email	Dec 10, 2021	Kathryn
Abbreviated Protocol for Minimal Animal Involvement form	Nicola Koper	Email	January 3, 2022	Kathryn
Integrated Project Plan	Nicola Koper, Zoe Nakata, Kevin Fraser, Sheldon McLeod	Email	January 30, 2022	Kathryn
Discuss expectations and standards of animal care protocol of Wildlife Haven.	Zoe Nakata	In-person meeting	February 20, 2022	Kathryn

Discuss standards of banding protocol of Delta Marsh and expectations from joint banding program with Wildlife Haven.	Paula Grief	Phone call meeting	February 28, 2022	Kathryn
Review Bird Banding Protocol document	Zoe Nakata	In-person meeting, email document	March 20, 2022	Kathryn
Progress Update	Nicola Koper	Virtual meeting	March 23, 2022	Kathryn
Review draft partnership agreement	Paula Grief, Zoe Nakata	In-person meeting	April 5, 2022	Kathryn
Send revised draft partnership agreement	Paula Grief, Zoe Nakata	Email	April 8, 2022	Kathryn
Approval of draft partnership	Paula Grief, Zoe Nakata	Email	April 15, 2022	Kathryn
Research paper consultation	Nicola Koper, Kevin Fraser, Paula Grief	Individual emails	May 1, 2022	Kathryn
Research paper outline feedback meeting	Nicola Koper	Virtual meeting, email document	June 15, 2022	Kathryn
Research paper draft feedback	Nicola Koper	Virutal meeting, email document	July 15, 2022	Kathryn

Send final practicum documents	Nicola Koper, Kevin Fraser, Zoe Nakata, Sheldon McLeod	Email	August 8, 2022	Kathryn
Adjudicate	Nicola Koper, Kevin Fraser, Zoe Nakata, Sheldon McLeod	In person meeting	August 22, 2022	Kathryn
Submit final copy of practicum documents	NRI General Office	Email	August 25, 2022	Kathryn

Promotions Plan

This plan outlines the messaging that will be utilized to communicate the announcement and purpose of the banding program at Wildlife Haven, as well as the role that the staff and volunteers will play in its operation. It also outlines the communications intended to announce the project to the public through Wildlife Haven’s social media channels and other outreach avenues. This plan includes sample content. It is important that Wildlife Haven is transparent in its communication of the objectives and role of the banding program in furthering Wildlife Haven’s growth.

- I. What is the overall goal of the Project?
 - A. The goal is to bring Wildlife Haven and Delta Marsh Observatory together to form a partnership to develop an ongoing banding program that will aim to monitor avian patients post-release from their care at Wildlife Haven. This data will provide valuable insights into the survival rate of patients post-release as well as furthering the knowledge base for population studies of Manitoba’s bird species.
- II. What is the promotion plan intended to achieve?
 - A. The banding program will take place at Wildlife Haven where we have a team of dedicated staff and volunteers. They play key roles in the rehabilitation of all our patients, including the avian patients. It will be

important to communicate to our staff, volunteers and community how the banding program will operate here on site, as well as what the potential impacts will be. The banding program will impact the rehabilitative protocol by making time for the banding to take place, as well as potentially altering where certain birds are released in some cases (i.e. those that will be released at Oak Hammock Marsh when convenient).

III. Intended Audiences

- A. The intended audiences include the committee, the staff and volunteers at Wildlife Haven, and members of our supportive community of donors and concerned citizens.

IV. Key Messages

- A. A partnership between Wildlife Haven and Delta Marsh Observatory to band birds is beginning in Spring of 2022.
- B. Banding avian patients will contribute to long-term population studies that reveal changing trends, reproductive patterns, behavioural insights and migratory pathways. It will provide Wildlife Haven with short-term data on post-release survival when birds are able to be released at Oak Hammock Marsh and potentially recaptured.
- C. We can educate the public via our social media platforms about the benefits of banding bird programs and how they can help report the band numbers of deceased birds they may come across.
- D. Our staff will have to communicate to the Rehabilitation Manager when they think a bird patient is just about ready for release, so that we can plan for the bird to be banded.

V. Suggested Communication Vehicles

- A. Our staff and volunteers will be sent an internal notice regarding the banding program developments. They will be informed via email and likely an internal staff meeting.
- B. We will use our social media platforms (facebook, instagram, etc.) to inform the community of the new banding program. We will likely include

the news in our springtime seasonal newsletter to our donor list. If they have questions we will communicate with them via email or phone.

VI. Timing in Relation to Project Activities

- A. The staff and volunteers will be informed of the project as spring approaches. After the draft agreement has been approved by Wildlife Haven and Delta Marsh, we will then inform our internal team.
- B. Once the project is up and running it will be up to Wildlife Haven to inform the general public and community of the banding program.

Internal Plan

In order to develop a successful banding program, Wildlife Haven will ensure that their staff and volunteers are not only aware of the goals and objectives, and are positively engaged in the responsibilities that come with managing the bird banding program. As a bird in care heals and progresses through rehabilitation, the staff and volunteers that feed and care for the patient everyday will ultimately play an integral role in communicating when that patient is ready to be banded to the Rehabilitation Manager. As such, it is important that our internal team is aware of the banding protocol and process, as well as the broader goals.

External Plan

Wildlife Haven is a non-profit charitable organization that relies on donations from individuals and businesses within the community. It is important that supporters and donors are aware of our active partnerships and understand the goals of our projects in order to retain their support. While banding is considered controversial by some people, we believe that we could teach our community about the importance of the banding program through an engaging, informative media campaign. WHRC will produce a joint media press release along with DMBO and OHM to announce the partnership. In addition, WHRC will create a blog post and accompanying social media posts to announce partnership and inform followers how they can contribute.

To track patient survivability, we will develop a citizen science monitoring program. Facebook has a few general Manitoba wildlife and bird watching groups that have previously welcomed posting for our cause, so we will use this platform to alert

bird watchers to report any banded bird they can positively ID. With a following of over 10,000 people on Instagram alone, we have the potential to reach many avid bird watchers. WHRC will also reach out to Project FeederWatch to disseminate instructions to their followers for detecting and recording banded birds as the banding program gets underway.

While outside the scope of this project, WHRC will create a page on their website designated to this program. There will be a “Report My Sighting!” submission box in which people can report sightings of banded birds with the species ID and photos if possible. The Canadian Environment and Natural Resources Agency offers a website and phone number to report physically recovered bands, but does not offer a resource for simply spotting bands on birds in the wild. With this data we could triangulate sightings with banded bird release locations to see if the spotted bird could be one of ours.

Sample Social Media Post:

Wildlife Haven Rehabilitation Centre is proud to announce a new partnership with Delta Marsh Bird Observatory and Oak Hammock Marsh. Together, they are introducing a Bird Banding Program at Wildlife Haven. The goal is to learn more about Manitoba’s native songbird population and monitor avian patients post-release.

Bird banding involves the attachment of a small, non-invasive aluminum band to a bird’s leg. Each band has its own unique number in the event that the bird is re-caught or the band is recovered in the future. Wildlife Haven will be banding songbird patients already in care before their release.

The data collected includes species ID, sex, age, reproductive status and other measurements like wing length and weight. This information is then used to learn more about migration, lifespan, reproductive success and population demographics. By studying these data, scientists can establish important breeding grounds, migratory patterns, discover what certain species need most at certain times of year and more. This research can then contribute to conservation efforts to establish protected areas

and develop policies that will protect birds and their habitat. It is important to protect ecosystems that support biodiversity to help wildlife thrive.

Delta Marsh has been the only Manitoban banding station in the continent-wide Canadian Migration Monitoring Network since 1992. Operating out of the Oak Hammock Marsh Wildlife Management Area, the organization has banded over 50,000 songbirds since its inception. Wildlife Haven admits hundreds of songbirds into care annually from all over the province. As a team, Wildlife Haven and Delta Marsh Bird Observatory can contribute valuable data to conservation efforts in an effort to protect Manitoba's wildlife.

Here's how you can help! Grab your binoculars and start birdwatching! If you see a bird with a silver aluminum band, you can report it to Wildlife Haven. It's that simple. Report any sightings to our website and any recovered bands to reportband.gov or call 1-800-327-BAND (2263) toll-free to leave a message.

CHANGE MANAGEMENT PLAN

Changes will likely be requested throughout the project, especially when it comes to the draft agreement and the Wildlife Haven banding protocol document. As the project manager, I will have to be open and willing to make any necessary changes that project partners or committee members ask of me. If I do not agree with requested changes, I will have to be prepared to back up my decision appropriately.

The anticipated changes to be made within this project will likely be edits to written documents (i.e. the banding protocol and draft agreement) in an effort to communicate effectively through the deliverable documents. They will likely not be major changes to the project goals or objectives itself. When necessary, the concerned parties will be communicated with directly and I will limit communication of changes to only those that need to know.

Most of the meetings held will be one-on-one meetings with project partners. I will be taking notes at these meetings and making note of any requested changes. Other change requests may come to me through email or phone calls, and all changes will be kept in an active document found in the appendices under "Change Log".

Chapter 2: Suggested Outline of Draft Agreement Between a Wildlife Rehabilitation Centre and a Bird Banding Station

This framework is a suggested outline for a partnership agreement between a wildlife rehabilitation centre and a bird banding station. It has not been approved by a wildlife centre or banding station and must not be used as a legal document or by any third parties as a template for other agreements.

Developing a Bird Banding Program at a Wildlife Rehabilitation Centre

By partnering with the bird banding station to band avian patients, the Centre will gain valuable insight into the post-release survival of our songbird patients. The banding station, in turn, is able to band birds they may not normally observe at their facility. They are able to expand the number of birds they band and potentially band new species. Through recaptures and band recovery, the Wildlife Rehabilitation Centre can learn how the released songbirds have developed since being in care. By measuring such metrics as weight, reproductive status, fat development and feather condition, they can gauge whether the bird's condition has improved or deteriorated since being in care, therefore guiding the development of new animal care protocols.

Conservation is a pillar of the Wildlife Rehabilitation Centre's mission. They believe that by banding birds in care, they can contribute to research and conservation efforts in the province and beyond. The intake team records details surrounding the circumstances of admission including where the bird was found, so geographic information is retained for the birds' natural history. The Centre hopes to see positive results in the long term: the Wildlife Rehabilitation Centre is working to develop a layered monitoring program to measure the survivability of patients post-release. They want to ensure their patients are thriving and practising their natural behaviours when released back into the wild.

Responsibilities of the Wildlife Rehabilitation Centre

The Wildlife Centre will:

- Provide accurate and reliable information about the bird's rescue location, reason for admission, and details of the care provided.
- Prepare a joint press release to announce partnership with the bird banding station.
- Conduct a media interview to announce partnership.

- Communicate to the head of the bird banding station at least a week before a Master Bander will be needed at the Wildlife Centre between September and April.
- Decide when it is the best outcome for a patient to be released at the bird banding station as opposed to where they were rescued from.
- Submit a monthly report to the bird banding station with a comprehensive list of the patients banded and their release location coordinates.
- Comply with the Bander's Code of Conduct when handling birds to band.
- Transport banded patients for release either to their rescue location or the banding station as decided by the Wildlife Centre's Rehabilitation Manager.

Responsibilities of the banding station

The banding station will:

- Provide the banding materials for procedure on-site at the Wildlife Centre.
- Plan to have a Bander on-site at the Wildlife Centre no less than once every two weeks from May through August, or more as needed.
- Conduct all banding procedures on site at the Wildlife Centre.
- Refer any reports made to the banding centre of injured birds and wildlife to call the Wildlife Centre's Wildlife Hotline for assistance.
- Highlight the Wildlife Rehabilitation Centre as a partner on the banding station website.
- Alert the Wildlife Centre of any injuries inflicted on birds during the banding process.

By signing this document you agree to the above responsibilities.

Date: _____

Banding Station Partner Name (print): _____

Banding Station Partner Signature: _____

Wildlife Rehabilitation Centre's Executive Director Signature:

Chapter 3: Wildlife Haven Bird Banding Protocol

This protocol was written for the sole use of Wildlife Haven Rehabilitation Centre. It is not to be used or copied by any other organization.

1 INTRODUCTION

Wildlife Haven Rehabilitation Centre (WHRC) is a non-profit, charitable organisation caring for Manitoba's injured, sick or orphaned wildlife in Ile des Chenes, Manitoba. Since its inception in 1984, WHRC has treated over 50,000 animals. The Centre takes in wildlife from across the province, treating a variety of species from raptors to songbirds, rabbits to coyotes. The mission of the organisation is to rescue, rehabilitate and release wildlife back to the wild, and to educate about the awareness, appreciation and peaceful coexistence with wildlife.

The organisation works closely with partners across the province to achieve its mission and protect wildlife. WHRC counts many funding and functional organisation businesses in Manitoba as partners in order to achieve the work of wildlife protection and education. Some of these include: the Manitoba Wildlife Branch, Assiniboine Park Conservancy, Winnipeg Humane Society and the Manitoba Metis Federation. Delta Marsh Bird Observatory (DMBO) has been a trusted research organisation banding birds since 1992, first at Delta Marsh and now on site at Oak Hammock Marsh in affiliation with the Harry J. Enns Wetland Discovery Centre. A partnership with DMBO will increase WHRC's ability to contribute to ongoing research as DMBO is the only Manitoba banding station within the Canadian Migration Monitoring Network (CMMN).

Wildlife Haven admitted 1,644 avian patients across 129 different species, successfully releasing 576 birds in 2021 alone. Because the hospital takes in patients from across the province of Manitoba, we treat a variety of different species. Songbirds are the most numerous of species admitted with 797 treated in 2021. By partnering with Delta Marsh Bird Observatory (DMBO) and Oak Hammock Marsh to band avian patients, we will not only gain valuable insight into the post-release survival of our songbird patients, but contribute to the research of avian migratory patterns in Manitoba. The province is host

to three migratory pathways, bringing millions of birds together annually on their way to summer nesting sites. Because WHRC treats birds from across the province, there could be opportunity to band avian patients that would not normally be found at Oak Hammock Marsh where DMBO operates.

The physical act of both banding and recovering those bands from birds are a small part of the reason behind banding birds. The data collected goes beyond identifying the species and location, but can speak to a larger picture when analysed alongside information from other banding stations across North America and over time.

Information recorded at the event of banding includes, but is not limited to, sex, reproductive status, age, moult, and weight. Data from banding programs can reveal migratory patterns, changes in population demographics, annual variation in breeding patterns and understanding of causes of avian mortality. While WHRC will not be using the traditional methods of capture and release, the addition of WHRC's patient data into the banding database will prove valuable as these birds would not likely have otherwise been banded in Manitoba.

This protocol is written to outline operational procedures for a bird migration monitoring program at Wildlife Haven Rehabilitation Centre to ensure that there is a consistent procedure adhered to by staff and volunteers so that all data collected from this program is considered true and comparable between datasets and years. This is to be used in conjunction with WHRC's existing Songbird Care protocols and the banding protocol of Delta Marsh Observatory. This protocol was developed in collaboration with the Rehabilitation Manager and Executive Director of Wildlife Haven to ensure that all needs of the project partner are met in this document. It is intended to be a living document that is amended as necessary by Wildlife Haven Rehabilitation Centre.

This protocol should be reviewed on an annual basis to ensure that all procedures are ethical and efficient. All staff should review this document prior to caring for any songbirds admitted that could be considered for banding. The ultimate goal of this program is to increase WHRC's knowledge of the songbird patients that come into care

and their survival post-release. By participating in the banding program, we will be able to compare the species we see from year to year as well as demographic characteristics.

1.1 Objectives

The long-term goals of this project are to band avian patients before they are released from rehabilitative care in order to monitor their survival post-release, and to contribute to migration monitoring data. This is to be done with the understanding that banded birds are rarely recaptured and there is a protocol within this document for public sightings and recording banded birds. The following are the objectives of Wildlife Haven's bird banding program:

- A. To conduct long-term monitoring research on eligible songbird patients that are admitted to WHRC for care and are scheduled for release.
- B. To develop a more comprehensive understanding of the avian patient composition at WHRC.
- C. To contribute to on-going migration monitoring efforts by DMBO as a part of the CMMN and through this project build WHRC's partnership with DMBO.
- D. To educate our community about the importance of banding programs and the way citizen scientists can contribute to conservation efforts.

WHRC will work towards these objectives by:

- Determining the age and sex of eligible songbird patients, as well as other morphological data such as moult, reproductive status (breeding vs non-breeding), body condition and mass when possible.
- To produce annual reports summarising the data collected from all banded patients and their history of care (circumstance of admission, location found, length of stay, location released, etc) while at WHRC.
- Producing the most consistent and robust data through the following of the protocol written in this document.

- Developing a graduate student research program where our patient data is used to develop and answer research questions (i.e. where cat caught birds happen most frequently in the Winnipeg so we can avoid releasing patients in those areas, or highlight need for policy enforcement on regulations for outdoor cats)
- Developing effective and clear content for the general public, educating them about our banding program, the goals of the program, and how they can contribute valuable data while bird-watching.

2. BANDERS CODE OF ETHICS

The Banders Code of Ethics is a standard document first written by the North American Banding Council and altered to reflect the needs of specific banding projects. This version is taken from Delta Marsh Bird Observatory and is cited as such. Only what is not relevant to banding procedures at Wildlife Haven, such as protocols regarding net set up, are omitted.

- A. More than anything else, banders are responsible for the safety and welfare of the birds they study. Stress and risks of injury or death need to be minimised. Some basic rules are as follows:
 - a. Handle each bird carefully, gently, quietly and with respect
 - b. Capture and process only as many birds as you can safely handle
 - c. Do not band outdoors in inclement weather
 - d. Frequently assess the condition of traps and nets and repair them quickly
 - e. Trainees must be properly trained and supervised
 - f. Use the correct band size and banding pliers for each bird
 - g. Treat all bird injuries in the most humane way
- B. Banders must continually assess their own work to ensure that it is beyond reproach.
 - a. Reassess methods and your approach whenever an injury or mortality occurs
 - b. Accept constructive criticism from other banders
- C. Banders must offer honest and constructive assessment of others' work to help maintain the highest standards possible.
 - a. Publish innovations in banding, capture and handling techniques
 - b. Educate prospective banders and trainers
 - c. Provide feedback of any instances of mistreatment of birds to the bander
 - d. If there is no improvement, then file a report with the Banding Office
- D. Banders must ensure that the data gathered are accurate and complete.
- E. Banders must obtain permission to band on private property.

Taken from A Manual for Bird Banding & Migration Monitoring at Delta Marsh Bird Observatory & Wetland Discovery Centre Oak Hammock Marsh (Grieff, 2000).

3 CRITERIA FOR BANDING

As a pilot program, WHRC will start by banding songbirds. In the future, raptors or other tracking strategies, such as radio transmitter tags may be introduced into the program. Part of the reason for this is that DMBO has the expertise, materials, and permits necessary to conduct the banding for songbirds at this time. Raptor or waterfowl banding programs require additional permits and equipment. Introducing geo-tags or coloured bands will also require the development of additional protocols. By starting with songbirds, Wildlife Haven will keep costs at a minimum and the partnership with DMBO can be more thoroughly developed over time. The following criteria will be following during the banding process:

- Patients are not to be handled more than is necessary for their rehabilitative care. This means that banding will take place when a songbird is being transferred to an outdoor enclosure or is set for release. Considerations for timing can be made at the discretion of the Rehabilitation Manager.
- They will be banded before release, as close to their pre-release examination as possible, such as when transferred to carrying crates or when they are moved to the outdoor enclosure.
- When possible, all birds upon intake will have photos taken of their tail feathers, spread wings, and full body for their patient record and training purposes for staff and volunteers.
- WHRC will not keep a bird in care for longer so it can be banded. If a bird is ready for release, it is up to the discretion of the Rehabilitation Manager to decide whether it will be banded and when.
- Only birds approved for banding by the Rehabilitation Manager will be considered.

3.1 Banding requirements

Each avian patient has distinct requirements of their care. Each species is different and the needs of rehabilitative care will be considered before the needs of the banding program. All native songbird species will be included in the program. In addition to the

banding requirements set out by the Banding Office of Canada, WHRC will also follow these criteria to determine which birds to band:

- WHRC will band only native songbirds for the time being.
- Only birds that have reached their growth maximum will be banded, regardless if they are a nestling or fledgling.
- If the patient has a natural history of succumbing to acute stressors, the bird will not be banded. If the bird has shown signs of extreme stress (gaping, closing eyes, lying limply or fluffing up feathers consistently) during previous examinations, then it will not be banded unless the Rehabilitation Manager has given it approval.
- If the patient is recovering from a leg injury, the bird will not be banded until injury is fully healed.

4 BANDING PROCEDURE

There are strict protocols that must be undertaken when banding birds. WHRC currently has no certified bird banders on staff and thus will not be banding any patients themselves. A certified designate from DMBO will be required to be on site and conduct all banding procedures at WHRC until a member of the Wildlife Haven team is a certified bird bander. The Manual for Bird Banding & Migration Monitoring created and followed by DMBO will be the standard protocol for all banding activities at WHRC.

The Rehabilitation Manager will set up a weekly banding appointment with Paula Grief of DMBO, or less frequently as needed. All banding will take place on site at WHRC either in the hospital before transfer to or in the outdoor enclosures. Birds that are being transferred to the outdoor enclosures will be banded as they are released from their carrying crate into the new enclosure. Birds that are set for release that day will be banded as they are caught and placed in their carrying crate.

- Only a certified bird bander is permitted to band a bird unless a Master Bander says otherwise and remains present through the process.
- No less than two people must be present for the banding procedure, unless otherwise permitted by the Bander in Charge. One person must scribe while the other bands birds.
- The bander will identify the species, sex, age, reproductive status, and measure moult, wing length, and tail length whenever possible.
- A bird will be released immediately back to its enclosure if it shows signs of stress such as open-mouth breathing (gaping), closing eyes, or fluffing up feathers consistently. The Rehabilitation Manager or Veterinarian will have to determine when the bird has calmed down enough to continue the banding process.
- When talking is necessary, low, quiet voices are to be used in the presence of songbird patients.
- WHRC will document band numbers in the patients' files under "band number".

- WHRC will keep a copy of all information collected during banding procedure, including patient ID number, species, sex, age, reproductive status, moult status, wing length, tail length, and whether it was released immediately after banding and where.
- DMBO will submit records to the Banding Office.

5 CRITERIA FOR RELEASE

It is the responsibility of WHRC to ensure that patients are ready to return to the wild before being released. Ultimately it will be up to the Rehabilitation Manager to decide when that will be. There are criteria already in place at WHRC, such as minimum weight requirements and adequate demonstration of prey capture, that must be met for certain species before release. The following protocols will be in addition to the existing criteria previously laid out by WHRC:

5.1 Location

Wildlife Haven's mission is to rescue, rehabilitate and release wildlife back to the wild. As such, WHRC will release patients back to the location where they are found whenever appropriate. Especially in cases where the songbird patient is known to have a mate or nestlings left behind, WHRC will release back to that location as soon as possible.

There are some circumstances in which patients will not be returned back to their original location:

- If the reason for admission was due to a cat or dog attack or other unsafe environmental factor.
- If the patient was unnecessarily orphaned by the finder (direct human intervention).
- If the area is a dense urban environment (i.e. downtown Winnipeg).

In these cases, the songbirds will be released either to a park or natural setting near to where they were found or to Oak Hammock Marsh when appropriate for that species. The Rehabilitation Manager will decide when Oak Hammock Marsh is a suitable release location. WHRC will document the exact release coordinates in patients' files and include this in a monthly report to DMBO.

5.2 Timing

Considerations will be made for the time of year for where and when songbirds are released as well. Migration patterns will be accounted for - songbirds that are admitted late in the fall will be kept in care overwinter if necessary. The overwintered patients will then be banded in the spring before release. Season will also be taken into consideration and patients that are breeding will be released back to where they came from whenever possible; however, their rehabilitative and medical needs must be resolved before release. The birds must be released when the weather is favourable. Birds will not be released when there is heavy rainfall or it is very cold outside. As noted above, the bird's migratory patterns will be cross-referenced with eBird if there is any doubt that the bird can safely migrate. If the migration window has passed, the bird must over-winter or be transported to a region where they are known to be at that time. All provincial and federal regulations will be followed when transporting wildlife over provincial or federal borders.

5.3 Predictors of Success

Before any patient is released, certain predictors of success must be met. These include the confirmation that the patient can hunt, fly or forage as they normally would in the wild. For example, aerial insectivores must be witnessed catching insects mid-flight before they are released. Flighted birds must demonstrate the ability to fly without wing droops or irregular wing movements. The patient's weight and body condition must be such that the patient is maintaining a healthy weight appropriate to its species. Refer to the WHRC Animal Care Protocols when needed. The general condition of the patient must be deemed appropriate for return to the wild by the Rehabilitation Manager.

6 POST-RELEASE MONITORING

WHRC is dedicated to learning and furthering its growth down new paths. As a growing organisation, we are looking for new ways to contribute to conservation and research communities in Manitoba. As such, conservation is a pillar of Wildlife Haven's mission. WHRC believes that by banding birds in care, we can contribute to research and conservation efforts in Manitoba and beyond. With the detailed data collected at a patient's intake, during banding, and before their release we will have a comprehensive record of the birds in care. We hope to see positive results in the long term. Wildlife Haven is working to develop a layered monitoring program to measure the survivability of patients post-release. We want to ensure our patients are thriving and practising their natural behaviours when released back into the wild.

6.1 Sightings

It is understood that less than 1% of songbird bands are recovered annually (Canada 2020). However, with the increase in bird watching activity across North America since 2020 (Hochachka 2021) it is likely that avid bird watchers will be able to report seeing banded birds, but perhaps not recover the band. To this end, Wildlife Haven will dedicate a page of their website to this program to teach people about the importance of banding. There will be a submission box there where people can send in sightings or photos of banded birds from around Manitoba. While we understand that there is no way to know if they are birds banded in care at Wildlife Haven, if they are of the same species and location at which we released a bird, we could still consider that a likely match. There will also be a link to the government website to report recovered bands.

WHRC will not reveal the exact coordinates where birds are released. We will encourage people to birdwatch in all parks, Oak Hammock or other public spaces. Each year more people are joining the bird watching hobby (Hochachka 2021) making it an accessible, engaging way for people to develop their bird identification skills while making a difference in research. Citizen scientists can play a big role in reporting bands and bird sightings; they are filling the gaps for scientists around the world. Sullivan et al

(2014) reported that the volume of eBird data increased by 30-40% annually between 2003 and 2013. Citizen scientists are eager to help contribute to research and a growing number of people are engaging in projects like this (Sullivan et al 2014). The more people we make aware of the banding program, the more likely people are to report any recovered band they find. By teaching people about the importance of bird banding, reporting the bands and the integral role of birds in our ecosystems, we can expand the network of people who are invested in the bird banding program. Wildlife Haven has a number of avid wildlife photographers in Manitoba that have already expressed interest in helping the cause in any way they can. By utilising volunteers in this way, WHRC can ensure the quality of a high portion of the information gathered will be high.

The use of coloured bands in addition to the aluminum bands could be helpful for specific populations of birds. Coloured bands allow birds to be more easily identified without having to recapture them to read the unique code found on the aluminum band. This would be useful for species that WHRC chooses to “soft release” and continue to monitor over a given period of time. This could be helpful with juvenile birds that are raised in care from hatchling or nestling ages to better measure how they survived once released. A visual inspection of a bird could show an observer the feather condition, whether it’s nesting, or if it’s finding food, for example. Because the release coordinates of all banded birds will be noted, WHRC could send volunteers out to known release sites of colour-banded birds periodically to assess their status. Coloured bands would make it easier for members of the public to report sightings as well.

6.2 Recaptures & Recoveries

DMBO bands birds during spring and fall migration, generally for a number of weeks between May and September. A recapture refers to a bird that has been banded at the same site but captured on a different date. DMBO has a protocol for recapturing songbirds in place, and will also maintain copies of data sheets for birds banded at Wildlife Haven in case they recapture a previously banded WHRC patient. All recaptured birds have the same metrics taken as a newly banded bird (i.e. weight, wing

length, reproductive status). In the case that DMBO recaptures a WHRC bird, we will be able to compare the new metrics to those taken when it was previously banded. This can tell us whether it is foraging successfully (weight), reproducing (brood patch or cloacal protrusion) or getting ready to migrate (moult). These metrics will thus give WHRC data on that patient's survival status post-release. While in the preliminary stages of developing a post-release survival monitoring program, this is the first step in the process. Any recaptures or recoveries will be reported in the patient's file.

On an annual basis, a WHRC representative will cross-reference all patients banded the year previous with the records found through the Bird Banding Office to see if any of the banded patients have been recaptured or the bands recovered. Any new information will be recorded in a Master List of Banded Birds at WHRC (see Table 4). The next section will discuss the future direction of the monitoring program.

7 FUTURE OF PROGRAM

Wildlife Haven is committed to developing a post-release survival monitoring program beginning with banded songbirds but with intentions to expand the program. While WHRC is going to band songbirds to start, as the banding progresses and when funding is secured, the criteria for banding will likely expand to raptors (owls, hawks, etc). Since 2015, WHRC has treated over 1000 raptors, successfully releasing 291 individuals. Expanding the program to include raptors will require new partners. We have previously worked with the Peregrine Falcon Recovery Project in the care of some of their banded Peregrines, as well as with Discover Owls in capturing injured owls or re-nesting owlets when possible. This would be a unique banding program in Manitoba and could advance what researchers and policy makers know about the movements and habits of native Manitoban raptors, both migratory and non-migratory.

The implementation of direct tracking methods, such as MOTUS, GPS or light-level geolocators, to track patients post-release is an exciting possibility as well. To date, only Purple Martins and a limited number of shorebirds have ever been tagged using this technology in Manitoba. There are currently 8 active receiving stations spread across the province. With the infrastructure already in place, a WHRC tagged bird being detected by one of these outposts would be possible. This would provide live data on post-release survival and movements of the bird giving us valuable information for our rehabilitation program. The placement of a MOTUS receiver at specific release sites of MOTUS tagged birds would drastically increase the likelihood of tracking birds post-release, especially when optimized by tagging birds that are released in their known territory or would likely return to that area. While the banding program is limited to birds at the moment, geo-tags are available for mammals as well, expanding the potential for the species we are able to monitor post-release. WHRC could also apply to host a station antenna on-site with proper funding which would contribute to tracking the movements of all MOTUS tagged wildlife.

To increase funding for learning opportunities, WHRC wants to develop a graduate student research opportunity program. We hope to provide graduate students with

access to our patient database that has a wealth of data waiting to be analyzed and translated into usable information. This information could involve the banding program, the introduction of coloured bands for species specific research, or a triangulation of geographic information in relation to patient admissions, however this research program would not have to be limited to banding and patient monitoring data. These students would have access to the entire patient database. Wildlife Haven believes that providing learning opportunities of all kinds is an exciting way to engage our community with the natural world. The results of this research will help propel WHRC further into the scientific community in Manitoba and beyond.

7.1 Future Objectives

As described above, these are objectives that WHRC could work towards in the future.

- Implement direct tracking devices
- Introduce colour bands for species specific research questions
- Expand program to other bird species, such as Raptors and Waterfowl
- Expand program to mammals or reptiles
- Introduce a Graduate Student Research Program

PROTOCOL APPENDICES

A. Promotions Plan

This plan outlines the messaging that will be utilised to communicate the announcement and purpose of the banding program at Wildlife Haven, as well as the role that the staff and volunteers will play in its operation. It also outlines the communications intended to announce the project to the public through Wildlife Haven's social media channels and other outreach avenues. This plan includes sample content. It is important that Wildlife Haven is transparent in its communication of the objectives and role of the banding program in furthering Wildlife Haven's growth.

Internal

In order to develop a successful banding program, Wildlife Haven will ensure that their staff and volunteers are not only aware of the goals and objectives, and are positively engaged in the responsibilities that come with managing the bird banding program. As a bird in care heals and progresses through rehabilitation, the staff and volunteers that feed and care for the patient everyday will ultimately play an integral role in communicating when that patient is ready to be banded to the Rehabilitation Manager. As such, it is important that our internal team is aware of the banding protocol and process, as well as the broader goals.

External

Wildlife Haven is a non-profit charitable organisation that relies on donations from individuals and businesses within the community. It is important that supporters and donors are aware of our active partnerships and understand the goals of our projects in order to retain their support or attract support from new donors. While banding is considered controversial by some people, we believe that we could teach our community about the importance of the banding program through an engaging, informative media campaign. WHRC will produce a joint media press release along with DMBO and OHM to announce the partnership. In addition, WHRC will create a blog post and accompanying social media posts to announce partnership and inform followers how they can contribute.

To track patient survivability, we will develop a citizen science monitoring program. Facebook has a few general Manitoba wildlife and bird watching groups that have previously welcomed posting for our cause, so we will use this platform to alert bird watchers to report any banded bird they can positively ID. With a following of over 10,000 people on Instagram alone, we have the potential to reach many avid bird watchers. WHRC will also reach out to Project FeederWatch to disseminate instructions to their followers for detecting and recording banded birds as the banding program gets underway.

While outside the scope of this project, WHRC will create a page on their website designated to this program. There will be a “Report My Sighting!” submission box in which people can report sightings of banded birds with the species ID and photos if possible. The Canadian Environment and Natural Resources Agency offers a website and phone number to report physically recovered bands, but does not offer a resource for simply spotting bands on birds in the wild. With this data we could triangulate sightings with banded bird release locations to see if the spotted bird could be one of ours.

Sample Social Media Post:

Wildlife Haven Rehabilitation Centre is proud to announce a new partnership with Delta Marsh Bird Observatory and Oak Hammock Marsh. Together, they are introducing a Bird Banding Program at Wildlife Haven. The goal is to learn more about Manitoba’s native songbird population and monitor avian patients post-release.

Bird banding involves the attachment of a small, non-invasive aluminium band to a bird’s leg. Each band has its own unique number in the event that the bird is re-caught or the band is recovered in the future. Wildlife Haven will be banding songbird patients already in care before their release.

The data collected includes species ID, sex, age, reproductive status and other measurements like wing length and weight. This information is then used to learn more about migration, lifespan, reproductive success and population demographics. This research can then contribute to conservation efforts. By studying these data, scientists can establish important breeding grounds, migratory patterns, discover what certain species need most at certain times of year and more. It is important to protect ecosystems that support biodiversity to help wildlife thrive.

Delta Marsh has been the only Manitoban banding station in the continent-wide Canadian Migration Monitoring Network since 1992. Operating out of the Oak Hammock Marsh Wildlife Management Area, the organisation has banded over 50,000 songbirds since its inception. Wildlife Haven admits hundreds of songbirds into care annually from all over the province. As a team, Wildlife Haven and Delta Marsh Bird Observatory can contribute valuable data to conservation efforts in an effort to protect Manitoba's wildlife.

Here's how you can help! Grab your binoculars and start birdwatching! If you see a bird with a silver aluminium band, you can report it to Wildlife Haven. Report any sightings to our website and any recovered bands to reportband.gov or call 1-800-327-BAND (2263) toll-free to leave a message.

Chapter 4: An Examination of the Role of Wildlife Rehabilitation Centres in Conservation Science

Introduction

In its simplest form, wildlife rehabilitation operations focus on helping sick, injured or orphaned wildlife return to the wild and their natural behaviours. Across the world, wildlife rehabilitation centres rescue millions of animals annually (Pyke and Szabo 2018). The central aims of these facilities tend to be animal welfare and conservation, but there are many more opportunities for research (Guy et al 2013). While not without controversy (Aitken 2004), wildlife rehabilitation centres can be seen as a pathway for humans to counteract their many negative impacts incurred upon wildlife. Wildlife rehabilitation centres play a unique role as stewards of local biodiversity, both in providing medical or rehabilitative care (Kwok et al 2021, Guy et al 2013) and in educating the public about needs of the ecological community (Pyke and Szabo 2018, Mcruer et al 2017, Long et al 2020). We can likely assume that as the global human population grows and urban areas encroach upon wild spaces, negative interactions between humans and wildlife will become more numerous and unavoidable. Data already shows that human-led causes account for up to 97% of admissions to wildlife centres (Cox 2022). Wildlife rehabilitation centres could play an integral role in the education of the public regarding how to peacefully coexist with wildlife and could provide data for innovative conservation management strategies.

Conservation efforts are generally tailored to the ecosystem and population levels, but wildlife rehabilitation is able to underscore the importance of the individual and remind people of the integral role that each animal plays in the bigger picture (Aitken 2004). The divergence of these values may result in a more comprehensive

knowledge base and ability to collaborate effectively to aid in conservation (Siemer et al 1991). Some wildlife centres treat thousands of patients a year, releasing healthy, strong animals back into the wild, which presumably re-enter a breeding population, which could be especially beneficial for species at risk (Aitken 2004, Cox 2022). As this paper will show, wildlife centres keep information on patients in a database with weights, sex, age, rescue location, circumstance of admission, and other medical observations, which could reveal patterns about species migratory, reproductive or dietary behaviours.

This section of the practicum will review the ways in which wildlife rehabilitation centres can contribute to conservation efforts and the potential outcomes of analysing the data produced from rehabilitative centres' records. It will discuss the importance of data created by wildlife rehabilitation centres, the role of wildlife centres in wildlife disease monitoring, the detection and mitigation of threats to wildlife, and conservation education.

Importance of Rehabilitation Data

Pyke and Szabo (2018) examined the available literature concerning the use of wildlife rehabilitation centre data and found that the research opportunities are well under-utilised: just 35 articles were discovered that used data from rescue databases. They concluded that considering the millions of animals rescued worldwide each year, there are very few peer-reviewed studies that extrapolate the data from rehabilitation centres (Pyke and Szabo 2018). One reason for this could be the inconsistencies of data input between wildlife centres. Scientific studies require consistency and accuracy of data used in the process. Wildlife rehabilitation centres must work to report accurate

data: spelling errors, species misidentification, lack of rescue details, and inconsistent labelling (i.e. usage of CAR versus HBC to reflect a car strike) are all reflective of the importance in collecting true data (Hanson et al 2021). These errors could lead to ineffective analysis and keep a study from being considered for publication. However, a growing number of rehabilitation centres use databases such as Wild-ONE or WRMD which provide similar data entry suggestions; this could help keep data consistent between different wildlife centres. Data extracted from large databases like these have contributed to studies examining threats to wildlife (Lloyd et al 2017, Demezas and Robinson 2021, Hanson et al 2021), wildlife diseases (Ana et al 2017, Brasic et al 2021, Nemeth et al 2007A, Nemeth et al 2007B) and the broad roles of wildlife rehabilitation centres in conservation (Pyke and Szabo 2018). Retrospective studies examining trends or aberrations in data could help at a local level in identifying new or emerging pathogens (Ana et al 2017) or shifts in the type of anthropogenic threats (Panter et al 2022). The trial and error that comes with rehabilitating wildlife can be used to further develop protocols and techniques in the future (Aitken 2004). This is especially important when it comes to the loss of biodiversity around the world, making the rehabilitation and release of every individual animal that much more important (Aitken 2004).

It is clear that monitoring the movement of wildlife has become an integral factor in the race to learn more about disease and viral transmission in wildlife populations (Ramey et al 2022), as discussed in previous sections. However, wildlife rehabilitation centre data can also be used to detect aberrations in standard wildlife behaviour. For example, between November of 2021 and May of 2022, Wildlife Haven Rehabilitation

Centre admitted 11 Snowy Owls, among which the reasons for admission were starvation, dehydration, and car collisions (Wildlife Haven 2022). By examining wildlife rehabilitation records for patterns in admission reasons indications of poor ecosystem health or a population irruption in a specific species could be detected.

Post-release survival monitoring of wildlife patients from centres is a topic that has been little studied in the past, but could contribute to new rehabilitation strategies as well as scientific research (Grogan and Kelly 2013, Sandberg et al 2022). Radio tracking or using leg bands for birds are commonly suggested as methods to conduct the monitoring (Guy et al 2013, Kelly and delBarco-Trillo 2020, Myers and Young 2017, Panter et al 2022). Despite the repeated suggestion, the use of tracking equipment by wildlife centres is rarely utilised. One of few studies available calculated the life-span of Red-Tailed Hawks in the wild versus rehabilitated Red-Tailed Hawks using a combination of national banding data and rescued animals, and assessed survival of rehabilitated Red-Tailed Hawks in Wisconsin (Sandberg et al 2022). While life-span was considered relatively equivalent, the study revealed interesting data about the survival rate of rehabilitated hawks. A mortality rate of 75% was found in just a 6 month period (Sandberg et al 2022), however this does not necessarily reflect poorly upon the rehabilitation process. It is easy to look at this one study and assume that rehabilitated hawks do not survive long in the wild, but there are many other factors that could impact survival rate, such as natural history, release location, and time of year (Sandberg et al 2022). In addition, “secondary anthropogenic mortality” from human inflicted trauma can still occur, lowering the survival rate even further (Sandberg et al 2022). Because there are no other similarly designed studies, it is impossible to compare the true survival rate

post-release for rehabilitated animals. Support in the form of government funding or supply of banding or tracking materials could help more wildlife centres access post-release studies such as this in the future and shed light on rehabilitation success (Sandberg et al 2022).

Wildlife Disease Monitoring

The value of wildlife rehabilitation centres in wildlife disease monitoring is underfunded and underutilised (Siemer et al 1991, Ana et al 2017). In addition to the monitoring of known pathogens commonly found in wildlife, researchers are discovering more diseases jumping from wildlife to humans as urban areas encroach further into wild spaces and humans interact more often with wildlife (Farnese 2014). Diseases like rabies, parvovirus, West Nile Virus (WNV) and distemper are regularly studied zoonotic diseases that can pose great harm to humans but testing and monitoring wild animals for these diseases can be expensive and time-intensive for both rehabilitation centres and government conservation branches (Yabsley 2019; Ana et al 2017). These wildlife rehabilitation centres are inherently invested in the health of wildlife populations; collaborating effectively with wildlife rehabilitation centres around Canada to conduct disease monitoring could lead to earlier detection (Nemeth et al 2007a; Nemeth et al 2007b), sustained monitoring programs (Ana et al 2017), and increase public awareness (Randall et al 2012).

Wildlife centres may be the first to learn of a possible new disease pathogen and alert the local health authorities (Ana et al 2017, Nemeth et al 2007b). In the past, the Canadian government has reacted to a threat to human health from a wildlife disease without first addressing the health of the wildlife population itself (Farnese 2014). The

Canadian government does not monitor wildlife health unless it is known to impact humans or “consumptive uses of wildlife” (Farnese 2014). Only once a threat to human health or the economy has been detected, does the government react; unless the disease is already a known threat, there is no plan of action in place (Farnese 2014). This reactive response, paired with a lack of public awareness to emerging diseases, could lead to a slow development of regulatory pathways to deal with new threats and protect the public and biotic communities alike (Farnese 2014). Canada’s National Wildlife Disease Strategy contains six objectives: “prevention of emerging wildlife diseases; early detection of new diseases; rapid response to new diseases; effective disease management; education and training of wildlife specialists; and communication to further the coordination and collaboration necessary to attain the other goals” (Farnese 2014). The current detection method utilised by the federal government tends to be one of passive surveillance: relying on local authorities who come into regular contact with wildlife diseases to make a timely and accurate report of confirmed or suspicious cases (Farnese 2014). Rehabilitation centres are likely to be the first responders, along with Conservation Officers, to cases of animals exhibiting unusual behaviours or have been uncharacteristically easy to capture: signs that the animal is severely injured or suffering from disease (Randall et al 2012; Yabsley 2019). However, most centres do not receive provincial or federal financial subsidies for their work in conservation (Cox 2022), let alone wildlife disease monitoring, and therefore may not have the resources to detect new or emerging diseases. By utilising wildlife patients as samples in existing passive surveillance programs, health authorities could identify

pathogens sooner or detect emerging pathogens in a more direct and cost effective way (Nemeth et al 2007a, Nemeth et al 2007b).

Studies on the prevalence of West Nile Virus (WNV) in avian populations have been conducted in part by using patients from wildlife rehabilitation centres (Ana et al 2017; Nemeth et al 2007a; Nemeth et al 2007b). In one Colorado study, the researchers created the Target Species Index to assess whether there was a most efficient bird species to test for detection of WNV (Nemeth et al 2007a). This study revealed that while corvids were the most effective for detection of WNV with an 86% positivity rate in the sample group, the inclusion of a greater and more diverse sample size could reveal species previously not known to be susceptible or aid in the earlier detection of WNV (Nemeth 2007a). Another study in the same region showed that 13.5% of raptors admitted to a wildlife rehabilitation centre in 2005 tested positive for WNV, with positive tests emerging a full 14 weeks earlier than other surveillance strategies (Nemeth 2007b). This was done using oral swabs which are a more timely, cost-effective method than lab testing (Nemeth et al 2007b). When provided by the local health authority, oral swabs could be a quick and cost effective aid for disease detection in the rehabilitation setting when used with the large and diverse sample size of admitted patients (Nemeth et al 2007b). By utilising existing, nontraditional resources, such as wildlife rehabilitation centres, health authorities and government bodies could learn more about the impact and evolution of specific diseases on wildlife and build a better understanding of disease transmission in natural ecosystems (Ana et al 2017).

Highly Pathogenic Avian Influenza (HPAI) is another viral influenza that quickly mutates and has high mortality rates in many different avian species (Kelly et al 2008).

Some mutations result in 100% mortality of some species and a lower mortality or asymptomatic detection in others (Kelly et al 2008). The variability suggests that more research should be conducted looking at the symptomatic differences and susceptibility between species because wildlife centres could then more effectively assess and triage patients during outbreaks. While HPAI is not a new disease to North America, the combination of a continuing exchange of evolving viruses between wild and domestic birds and the passage of HPAI between migratory birds across continents, this virus is no longer an isolated threat to North American birds as it once was in 2014 (Ramey et al 2022). A recent case of HPAI spread in the United Kingdom in which multiple swans, seals and a fox all died while in care from the virus, highlights the importance of wildlife disease surveillance (Floyd et al 2021). In this example, HPAI was not suspected at the time of admission for any patients, nor were any of the patients in question brought in at the same time or from the same location (Floyd et al 2021). The deaths of the swans occurred less than a week after the last swan was admitted, and the subsequent deaths of the 5 seals and the fox followed a week after that (Floyd et al 2021). The cases went undetected until it was too late because regular or random testing for HPAI was not a part of the standard treatment protocol: disease surveillance at a wildlife rehabilitation facility should be done more regularly, even outside of the timeframe of an outbreak, in order to monitor the presence of disease in wild populations. This could alert local authorities in enough time to implement mitigation measures such as increased surveillance, suspension of bird banding programs, removal of bird feeders or baths, and more stringent biosecurity for poultry farms.

The bodies of admitted wildlife patients can also be used to advance the knowledge of parasitology in wildlife populations. Collaborative efforts between researchers, government entities and rehabilitation centres in Manitoba have resulted in the expansion of knowledge of existing and discovery of new ectoparasites and mites within wildlife populations (Bochkov and Galloway 2013, Galloway 2012). In another example, researchers in California were able to detect Chlamydial infections in raptors admitted to wildlife rehabilitation centres using both live and deceased specimen samples in order to assess the prevalence of the bacteria in wild birds (Seibert et al 2021). A high positive presence of Chlamydia in winter months suggested that perhaps the birds had reduced immunity due to environmental factors, a conclusion that otherwise would not have been reached (Seibert et al 2021). The study of both ectoparasites' and intestinal parasites' impact on wildlife could lead to answers for population declines in certain areas, such as with hedgehogs in the United Kingdom (Gaglio et al 2010). This research was conducted on hedgehogs that had died while in rehabilitative care, with examinations completed post-mortem (Gaglio et al 2010). This study revealed a heavy parasite burden for hedgehogs in Wales and England, which raised more questions about why certain geographic areas see higher caseloads and how it might impact the health of hedgehogs (Gaglio et al 2010). Zoonotic diseases that can transfer to humans (i.e. Chlamydia, SARS, WNV) are important to study in wild populations to assess which species or family groups are most susceptible, how these diseases spread, if there are seasonal patterns and to increase awareness to those that work closely with wild animals and the general public (Seibert et al 2021). Just as with HPAI or WNV, the usage of live or deceased specimens in wildlife disease research

could lead to new discoveries in diseases, parasites, and how these factors impact ecosystems.

Detection and Mitigation of Threats to Native Wildlife

Wildlife rehabilitation centres are called on by their community members to rescue and care for wildlife for many reasons. By examining patient database information, researchers can determine threats to local wildlife populations and work together with their communities and local government to establish strategies to create safer solutions. The majority of wildlife rehabilitation intakes are due to avoidable interactions with humans in some way. Collisions with cars, attacks by domestic pets, window-strikes and unnecessary orphaning are repeatedly reasons for wildlife admission to rehabilitation centres across the globe (Hanson et al 2021; Kwok et al 2021; Long et al 2020). The more that researchers are able to determine about the causes behind the threats to wildlife, the more prepared that policy makers are in developing mitigation strategies. Data from wildlife centres can identify threats that may not appear obvious or of great concern on the surface. Analysing admission records over time may then reveal changes in threats over time, such as an increase in window strike patients correlating with the urban expansion of a city (Panter et al 2022). This section will expand upon 4 major threats to wildlife as determined by data from wildlife rehabilitation centres: unnecessary orphaning, trauma, interactions with domesticated cats, and toxicity.

Orphaned wildlife are often the leading cause of admissions to wildlife centres (Cox 2022, Demezas and Robinson 2021, Long et al 2020, Hanson et al 2021). These patients are often labour intensive to care for as juveniles require more frequent

feedings and could be more reliant on their parents in the wild making them difficult to care for (Kelly and delBarco-Trillo 2020). Frequently, healthy, orphaned pre-adult patients do tend to have a high recovery rate; however, these numbers are likely to be different depending on the species (Kelly and delBarco-Trillo 2020). The age, species, and natural history of the orphaned patients must be closely evaluated by wildlife rehabilitators in order to create a specific treatment plan (Kelly and delBarco-Trill 2020). The younger the patient, the less likely they are to survive without almost constant care from staff (Kelly and delBarco-Trillo 2020). Unfortunately, this leads to high euthanasia rates for neonates or hatchlings, as resources are often limited to patients with a higher chance of survival, such as older juveniles (Kelly and delBarco-Trillo 2020). Fortunately, unlike other threats to wildlife, the admission of unnecessarily orphaned animals is one that is entirely avoidable. To mitigate the loss of individuals due to unnecessary orphaning, public awareness and clear communication with the public about what to do when a nest or den is found with babies must be conducted.

Trauma of an unconfirmed origin can generally stem from a direct interaction with humans, such as car collisions, run-ins with lawn mowers or large farming equipment, bullet wounds, habitat destruction, or entrapment from fishing tackle and nets. Indirect causes include, but are not limited to, window strikes, collisions with wind turbines, electrocution, or entrapment in structures. The total number of animals struck by a vehicle collision is difficult to quantify, but it is clear from wildlife centre data around the world that car strikes are a major threat to wildlife (Panter et al 2022, Hanson et al 2021, Molina-Lopez et al 2017). A review of 19 years worth of data for avian patients of 4 centres across Western England revealed window strikes and car collisions were the

cause of 30% of admissions combined (Panter et al 2022). The number of unknown causes of trauma admissions were 26%, which could be unknown because a car or window strike was not witnessed by the rescuer (Panter et al 2022). This data was then used to geo-reference the cases to investigate whether urbanisation played a role in traumatic injuries to wildlife: a positive association between the two was discovered, with increased admissions from window strikes and increased public persecution (i.e. unnecessary orphaning) compared to rural environments (Panter et al 2022). In addition, certain species will be more likely to be hit by vehicles, like vultures or other scavengers, as they consume carrion alongside roads (Schwartz et al 2018). Turtles are also known to be common victims of car strikes as they are often observed crossing roads during nesting season in early summer (Farmer and Brooks 2012). As speed limits increase from 20km an hour to 50km an hour, the probability for an animal to be struck by a car increases from 0.1 to 0.75 for a given location in Ontario, Canada (Farmer and Brooks 2012). The implications of this data could lead to local governments and city planners reducing speed limits, installing signage, or designing wildlife corridors to mitigate the threat to wildlife from roads (Farmer and Brooks 2012, Cox 2022).

Animals that are admitted due to an interaction with a cat have high rates of mortality, whether they are euthanized upon intake or die while in care (Demezas and Robinson 2021, Garrigan et al 2021, Mrcruer et al 2017). Estimates show that domestic house cats are responsible for the greatest number of avian deaths in the United States, as well as in Canada (Loss et al 2013). The actual number of wildlife that are killed or admitted to rehabilitation centre due to cats is much higher than what is reported in the

data due to the difficult nature of determining cat caught wildlife if the attack is not witnessed by a rescuer (Wildlife Haven 2022, Demezas and Robinson 2021, Mrcruer et al 2017, Lloyd et al 2013). Video footage taken in a study of 55 free-roaming cats revealed that nearly half of prey the cats captured were left after the attack and 28% were consumed, showing the sheer number of prey that never make it to a rehabilitation centre (Lloyd et al 2013). For those animals that are brought in for care, their prognosis is often very poor. In one study out of West Virginia, the mortality rate was 80.8% for small mammals due to cat interaction, and 70.8% for small birds (Mrcruer et al 2017). Another study examined the data from 82 centres across the United States and found that domestic pets in general were to blame for 14% of the total admissions; this came with a 78% mortality rate (Lloyd et al 2017). Injuries from cat interactions are not always obvious. Rehabilitation data across all taxa out of New York State in just one year showed 3936 cases in which cats were confirmed to have been the predator, and another 4500 patients admitted with wounds of an unknown predator origin (Hanson et al 2021). Data from one rehabilitation centre revealed that care for both cat and dog captured patients, including those that did not survive, cost a total of \$7,557 USD for one year (Garrigan et al 2016). These cases were only about 10% of the total admitted patients for the year, shedding light on the monetary burden to wildlife centres, in addition to the ecological impact, of cats on wildlife (Garrigan et al 2016).

Unfortunately, cats are not necessarily to blame in these situations. Cats are a non-native, ubiquitous species across the world, domesticated and introduced by humans capable of creating large territories where bird populations suffer and may lead to local extinction (Loss et al 2013). In one study, a number of surveyed cat owners did

not believe that free-ranging cats are ecologically harmful, even when provided evidence of their own cat's predatory behaviour (McDonald et al 2015). Survey respondents were against management strategies such as regulations on domestic cat movements and containment policies (McDonald et al 2015). This type of disconnect with the public can be a major challenge for conservationists but an area that wildlife centres can work to broach as discussed later in the *Conservation Education* section.

Wildlife centres treat animals each year that show signs of poisoning or toxicity, but are generally unable to identify a direct cause due to lack of diagnostic resources (Cox 2022, Yaw et al 2017). The detection and diagnosis of toxicity in wildlife can come at a great cost to wildlife centres and is little studied outside of the research on the impacts of lead. Studies in the United States have revealed elevated lead levels in Bald Eagles submitted to rehabilitation centres for decades (Brasic et al 2021; Yaw et al 2017; Slabe et al 2022). Recent data taken from across the U.S. showed that roughly 50% of bald eagles tested in one study had chronic lead poisoning, with the highest concentration in the Central Flyway which encompasses the Midwest (Slabe et al 2022). The study also found high susceptibility within the Golden Eagle population whose overall population status is considered stable at best (Slabe et al 2022). Another study found that 80% of all deceased eagles found in New York State had at least some exposure to lead with 17% of recent post-mortem studies pointing to death caused by lead poisoning (Hanson et al 2021). This could have serious implications for migratory Bald Eagles that travel between the U.S. and Canada each year, in addition to local populations. It is imperative that rehabilitation centres that treat Bald Eagles and other animals susceptible to lead toxicity are able to assess and treat these patients. Toxicity

from lead and other heavy metals or chemicals can lead to larger scale environmental issues with cascading effects (Hanson et al 2021). However, wildlife centres often do not have access to diagnostic equipment that could assess the toxin levels in an animal (Cox 2022). This equipment is expensive and may not be accessible to the large number of wildlife centres that are non-profit or volunteer-driven. The extent of lead toxicity in Bald Eagles outside of the United States is not known but it is likely present. 157 Bald Eagles have been admitted to Wildlife Haven Rehabilitation Centre in Manitoba since 2015 and could have been tested for lead if provided with the proper resources (Wildlife Haven 2022). If wildlife centres were able to conduct more random testing on patients for toxicity, a problem could be discovered much sooner than when it would otherwise be noticed at the population level.

Conservation Education

By becoming aware of the threats to native wildlife, rehabilitation centres could educate communities on how to live more peacefully with wildlife, in addition to sharing knowledge gained with conservation groups and local governments (Aitken 2004). Wildlife rehabilitation centres house an abundance of data on the impacts humans have on local wildlife. By harnessing this data, wildlife centres can educate people on how to change their behaviour in an attempt to reduce harmful impacts to wildlife (Mcruer et al 2017). For example, unnecessarily orphaned animals count for a large proportion of patient intakes but rehabilitation centres can provide educational content that can teach people how to tell if an animal is truly orphaned and in need of care preventing juvenile wildlife from being unnecessarily orphaned (Long et al 2020). It is dangerous for a member of the public to rehabilitate a wild animal on their own; if wildlife centres are

able to communicate these risks and further, the benefits of bringing the animal in for care, people will be less likely to be put in harm's way and attempt to do the work themselves (Cox 2022). Improving community knowledge about threats to local wildlife could help reduce the number of animals brought in for care at wildlife centres by increasing awareness of these issues and therefore lowering rehabilitative costs as well as contributing to conservation efforts (Hanson et al 2021, Kelly and delBarco-Trillo 2020). Reducing calls to city officials over alleged nuisance wildlife would also be a benefit of improving public awareness (Siemer et al 1991). As early as 1991, researchers in New York State identified the extent of the reach that wildlife centres have to the public (Siemer et al 1991). A shared responsibility in conservation education by local authorities and wildlife centres could not only expand the public messaging about coexisting with wildlife, but ease the burden to the government in responding to nuisance wildlife calls and information requested about local wildlife (Siemer et al 1991). After all, wildlife centres tend to be highly knowledgeable when it comes to how to tell if an animal is in need of human intervention and local wildlife ecology basics.

Communicating emerging trends in wildlife disease spread, such as the recent HPAI outbreak in North America, to communities can help in the detection of new cases as well the monitoring of seemingly healthy wildlife populations (Long et al 2020, Cox 2022). Wildlife centres can fill a gap between government bodies and the public by helping the public understand not only the severity of a health threat, but also how they can help minimise the spread of wildlife disease (Cox 2022).

Perhaps to a larger degree, the practice of connecting people with nature is one of the most valuable components of wildlife conservation. Author Gill Aitken believes

that the field of conservation is grounded in an individual's own experience with caring for an individual: "The emotion of caring drives and empowers the practice of conservation" (Aitken 2004). By teaching people about nature in general and showing them how to safely interact with wildlife, wildlife centres can therefore instil a sense of stewardship and responsibility to the natural world.

Conclusion

As we see the evolving impacts of climate change and continued habitat fragmentation, rehabilitation centres will be on the front lines of witnessing resultant changes in ecosystem dynamics and wildlife ecology. Through the examination of tens of thousands of patient records from wildlife rehabilitation centres, researchers have the potential to answer countless research questions. As I have shown, the data provided by wildlife centres is vast and could have multiple uses, whether it is disease monitoring, investigation of threats to wildlife, or conservation education. The wealth of this relatively untapped data could make a big difference in the mitigation of threats to wildlife in conjunction with existing conservation efforts. The potential for collaboration between wildlife centres, local authorities, and the public in protecting wildlife is high. By supporting wildlife centres financially or administratively through research resources, governments and researchers gain access to a wider knowledge base.

Many threats to wildlife are avoidable and could be more easily mitigated with the information provided by wildlife centres. Species at risk could especially benefit from receiving medical care and being returned to the wild. This paper has shown the potential services of wildlife centres in conservation research; however, further studies are needed on post-release survival in order to show the further value of wildlife

rehabilitation. This paper proves the necessity for further research to be conducted at wildlife rehabilitation centres. Establishing programs that specifically examine the role of wildlife rehabilitation in conservation science, such as bird banding, would be beneficial to wildlife centres in proving their value to their community and therefore attracting support and recognition. Each animal has a unique role to play in their ecosystem and wildlife centres are playing an important role in the conservation of such systems by providing care for those that are sick, injured or orphaned, with hopes of releasing back to their environments stronger than when they arrived. The role of wildlife centres in conservation will only grow and evolve as time goes on.

References

- Aitken, Gill. "Wildlife Rehabilitation as Conservation Strategy?" *A New Approach to Conservation*, 1st ed., Routledge, 2004, pp. 115–32, <https://doi.org/10.4324/9781351163569-7>.
- Ana, Alba, et al. "Syndromic Surveillance for West Nile Virus Using Raptors in Rehabilitation." *BMC Veterinary Research*, vol. 13, no. 1, BioMed Central Ltd, 2017, pp. 368–368, <https://doi.org/10.1186/s12917-017-1292-0>.
- Bochkov, Andre V., and Terry D. Galloway. "New Records and New Species of Mites of the Subfamily Harpirhynchinae (Acariformes: Harpirhynchidae) Infesting Birds in Manitoba, Canada." *Acta Parasitologica*, vol. 58, no. 4, Springer Vienna, 2013, pp. 405–19, <https://doi.org/10.2478/s11686-013-0172-4>.
- Brasic, Christine, et al. "Lead Toxicity in the Bald Eagle Population of the Great Lakes Region." *Mathematical Population Studies*, 2021, pp. 1–31, <https://doi.org/10.1080/08898480.2021.1983323>.
- Cox, S. "Reasons Why Animals Are Admitted to Wildlife Rehabilitation Centers in Canada". *Wildlife Rehabilitation Bulletin*, vol. 39, no. 1, May 2022, pp. 1-8, doi:10.53607/wrb.v39.173.
- Demezas, K. Grace, and W. Douglas Robinson. "Characterizing the Influence of Domestic Cats on Birds with Wildlife Rehabilitation Center Data." *Diversity (Basel)*, vol. 13, no. 7, MDPI AG, 2021, p. 322–, <https://doi.org/10.3390/d13070322>.
- Farmer, Robert G., and Ron J. Brooks. "Integrated Risk Factors for Vertebrate Roadkill in Southern Ontario." *The Journal of Wildlife Management*, vol. 76, no. 6, John Wiley & Sons, Inc, 2012, pp. 1215–24, <https://doi.org/10.1002/jwmg.358>.
- Farnese, Patricia L. "Searching for Wildlife: a Critique of Canada's Regulatory Response to Emerging Zoonotic Diseases." *Queen's Law Journal*, vol. 39, no. 2, Queen's University, Faculty of Law, 2014, p. 471–509.
- Floyd, Tobias, et al. "Encephalitis and Death in Wild Mammals at a Rehabilitation Center after Infection with Highly Pathogenic Avian Influenza A." *Emerging Infectious Diseases*, vol. 27, no. 11, U.S. National Center for Infectious Diseases, 2021, p. 2856–, <https://doi.org/10.3201/eid2711.211225>.

Gaglio, Gabriella, et al. "Parasites of European Hedgehogs (*Erinaceus Europaeus*) in Britain: Epidemiological Study and Coprological Test Evaluation." *European Journal of Wildlife Research*, vol. 56, no. 6, Springer-Verlag, 2010, pp. 839–44, <https://doi.org/10.1007/s10344-010-0381-1>.

Garrigan, E., T. Young, and B. Hagerty. "The Cost of the Outdoor Cat and Dog: Wildlife Rehabilitation in South Central Pennsylvania". *Wildlife Rehabilitation Bulletin*, vol. 34, no. 1, June 2021, pp. 1-11, doi:10.53607/wrb.v34.88.

Grogan, A., and A. Kelly. "A Review of RSPCA Research into Wildlife Rehabilitation." *Veterinary Record*, vol. 172, no. 8, BMJ Publishing Group Limited, 2013, pp. 211–211, <https://doi.org/10.1136/vr.101139>.

Guy, Amanda J., et al. "A Survey of Current Mammal Rehabilitation and Release Practices." *Biodiversity and Conservation*, vol. 22, no. 4, Springer Netherlands, 2013, pp. 825–37, <https://doi.org/10.1007/s10531-013-0452-1>.

Hanson, Melissa, et al. "Species, Causes, and Outcomes of Wildlife Rehabilitation in New York State." *PloS One*, vol. 16, no. 9, Public Library of Science, 2021, p. e0257675–, <https://doi.org/10.1371/journal.pone.0257675>.

Kelly, Gillian, and Javier delBarco-Trillo. "Importance of Taxonomic Group, Life Stage and Circumstance of Rescue Upon Wildlife Rehabilitation in Ontario, Canada." *Journal for Nature Conservation*, vol. 57, Elsevier GmbH, 2020, p. 1-7, <https://doi.org/10.1016/j.jnc.2020.125897>.

Kelly, Terra R., et al. "A Review of Highly Pathogenic Avian Influenza in Birds, With an Emphasis on Asian H5N1 and Recommendations for Prevention and Control." *Journal of Avian Medicine and Surgery*, vol. 22, no. 1, Association of Avian Veterinarians, 2008, pp. 1–16, <https://doi.org/10.1647/2006-036R.1>.

Kwok, Alan B. C., et al. "Trends in Wildlife Rehabilitation Rescues and Animal Fate Across a Six-Year Period in New South Wales, Australia." *PloS One*, vol. 16, no. 9, Public Library of Science, 2021, pp. e0257209–e0257209, <https://doi.org/10.1371/journal.pone.0257209>.

Long, Rachel B., et al. "Characterizing Trends in Human-Wildlife Conflicts in the American Midwest Using Wildlife Rehabilitation Records." *PloS One*, vol. 15, no. 9, Public Library of Science, 2020, pp. e0238805–e0238805, <https://doi.org/10.1371/journal.pone.0238805>.

Loss, Scott R., et al. "The Impact of Free-Ranging Domestic Cats on Wildlife of the United States." *Nature Communications*, vol. 4, no. 1, Nature Publishing Group, 2013, p. 1396–, <https://doi.org/10.1038/ncomms2380>.

Loyd, Kerrie Anne T., et al. "Quantifying Free-Roaming Domestic Cat Predation Using Animal-Borne Video Cameras." *Biological Conservation*, vol. 160, Elsevier Ltd, 2013, pp. 183–89, <https://doi.org/10.1016/j.biocon.2013.01.008>.

Loyd, Kerrie Anne T., et al. "The Role of Domestic Cats in the Admission of Injured Wildlife at Rehabilitation and Rescue Centers." *Wildlife Society Bulletin*, vol. 41, no. 1, 2017, pp. 55–61, <https://doi.org/10.1002/wsb.737>.

McDonald, Jennifer L., et al. "Reconciling Actual and Perceived Rates of Predation by Domestic Cats." *Ecology and Evolution*, vol. 5, no. 14, John Wiley & Sons, Inc, 2015, pp. 2745–53, <https://doi.org/10.1002/ece3.1553>.

Mcruer, Dave L., et al. "Free-Roaming Cat Interactions With Wildlife Admitted to a Wildlife Hospital." *The Journal of Wildlife Management*, vol. 81, no. 1, Wiley, 2017, pp. 163–73, <https://doi.org/10.1002/jwmg.21181>.

Myers, Patrick J. and Julie K. Young. "Post-Release Activity and Habitat Selection of Rehabilitated Black Bears." *Human-Wildlife Interactions*, vol. 12, no. 3, Jack H. Berryman Institute, 2018, pp. 322–37, <https://doi.org/10.26077/jnft-5796>.

(a) Nemeth, Nicole M., et al. "Avian Mortality Surveillance for West Nile Virus in Colorado." *The American Journal of Tropical Medicine and Hygiene*, vol. 76, no. 3, ASTMH, 2007, pp. 431–37, <https://doi.org/10.4269/ajtmh.2007.76.431>.

(b) Nemeth, Nicole, et al. "Surveillance for West Nile Virus in Clinic-Admitted Raptors, Colorado." *Emerging Infectious Diseases*, vol. 13, no. 2, U.S. National Center for Infectious Diseases, 2007, pp. 305–07, <https://doi.org/10.3201/eid1302.051626>.

Panter, Connor T., et al. "Causes, Temporal Trends, and the Effects of Urbanization on Admissions of Wild Raptors to Rehabilitation Centers in England and Wales." *Ecology and Evolution*, vol. 12, no. 4, John Wiley & Sons, Inc, 2022, p. e8856–n/a, <https://doi.org/10.1002/ece3.8856>.

Pyke, Graham H., and Judit K. Szabo. "Conservation and the 4 Rs, Which Are Rescue, Rehabilitation, Release, and Research." *Conservation Biology*, vol. 32, no. 1, Wiley Subscription Services, Inc, 2018, pp. 50–59, <https://doi.org/10.1111/cobi.12937>.

Ramey, Andrew M., et al. "Highly Pathogenic Avian Influenza Is an Emerging Disease Threat to Wild Birds in North America." *The Journal of Wildlife Management*, vol. 86, no. 2, Wiley Subscription Services, Inc, 2022, <https://doi.org/10.1002/jwmg.22171>.

Randall, Natalie J., et al. "Efficacy of Wildlife Rehabilitation Centres in Surveillance and Monitoring of Pathogen Activity: A Case Study with West Nile Virus." *Journal of Wildlife Diseases*, vol. 48, no. 3, Wildlife Disease Association, 2012, pp. 646–53, <https://doi.org/10.7589/0090-3558-48.3.646>.

Sandberg, J. E., T. R. Van deelen, and M. E. Berres. "Survival of Rehabilitated and Released Red-Tailed Hawks (*Buteo Jamaicensis*)". *Wildlife Rehabilitation Bulletin*, vol. 38, no. 1, Jan. 2022, pp. 28-39, doi:10.53607/wrb.v38.177.

Schwartz, Amy L. W., et al. "Roadkill Scavenging Behaviour in an Urban Environment." *Journal of Urban Ecology*, vol. 4, no. 1, Oxford University Press, 2018, <https://doi.org/10.1093/jue/juy006>.

Seibert, Brittany A., et al. "Chlamydia Buteonis in Birds of Prey Presented to California Wildlife Rehabilitation Facilities." *PloS One*, vol. 16, no. 10, Public Library of Science, 2021, pp. e0258500–e0258500, <https://doi.org/10.1371/journal.pone.0258500>.

Siemer, William F., et al. "Tapping the potential of the wildlife rehabilitation community for public education about wildlife damage management." Proc. East. Wildlife Damage Control Conference, 5, 1991, p 143-147.

Slabe, Vincent A., et al. "Demographic Implications of Lead Poisoning for Eagles Across North America." *Science (American Association for the Advancement of Science)*, vol. 375, no. 6582, American Association for the Advancement of Science, 2022, pp. 779–82, <https://doi.org/10.1126/science.abj3068>.

Wildlife Haven. Wildlife Rehabilitation Medical Database (WRMD). Wildlife Haven Rehabilitation Centre, Iles des Chenes, Manitoba, Canada. 2022.

Yabsley, Michael J. "The Role of Wildlife Rehabilitation in Wildlife Disease Research and Surveillance." *Medical Management of Wildlife Species*, John Wiley & Sons, Inc, 2019, pp. 159–65, <https://doi.org/10.1002/9781119036708.ch13>.

Yaw, Taylor, et al. "Lead Poisoning in Bald Eagles Admitted to Wildlife Rehabilitation Facilities in Iowa, 2004–2014." *Journal of Fish and Wildlife Management*, vol. 8, no. 2, U.S. Fish and Wildlife Service, 2017, pp. 465–73, <https://doi.org/10.3996/122015-JFWM-124>.

Chapter 5: Reflection on the Practicum Project

Introduction

I am thrilled to be writing the reflection portion of my Master's of Natural Resource Management. My journey as a Master's student has not been without trials and tribulations: just 5 months into my program a global pandemic interrupted my progress. Luckily, I had nearly finished my required coursework by that point. However, I did not foresee the challenge of pursuing a Master's degree from the comforts of my own home. Once perhaps a dream to be able to work from your own bed, as the pandemic wore on I found it more difficult to motivate myself and continue to find inspiration through a computer screen and countless zoom meetings. Having been removed six years from the world of academia since completing my undergraduate degree, reentering at a graduate level had seemed daunting yet thrilling. I felt prepared and excited to start this new chapter, to learn from my peers and network at such an esteemed level. Then, the pandemic made me question what I was doing in graduate school, how I planned to complete my degree and if it was all worth it. I am grateful to my advisor, Dr Nicola Koper, for standing by me and continuing to encourage me through the difficult times. She motivated me to pursue exactly what I wanted to with this degree though I may have switched focus a few times to get where I am today.

During the summer of 2021, I started a position as the Administrative Assistant at Wildlife Haven Rehabilitation Centre. Dr Koper suggested that I take the summer off from my studies to focus on my new job and perhaps find some inspiration pursuing this career path. After a few months being part of the Wildlife Haven team, I found that there was a wealth of potential in the data being generated over the course of treatment of wildlife patients at the Hospital and a desire from Wildlife Haven to utilise that data to help further conservation research. After discussing practicum project possibilities with the Wildlife Haven management team, we discovered a gap in determining success and the knowledge of post-release survival. I reasoned that by introducing a bird banding program with songbird patients, then Wildlife Haven could both contribute to long-term migration monitoring data and monitor their patients post-release to better assess their survival and therefore, rehabilitative success.

The scope of this project entailed just the development and planning process for the banding program and stopped short of the actual implementation. This allows Wildlife Haven to take the documents written (Banding Agreement, Protocol, Promotions Plan) and customise them to further suit their own needs down the road. As the project planning progressed, it became clear that this was the best way to have designed it because it did take pressure off of me to introduce the program to WHRC staff, volunteers and supporters by a certain date. It allowed for more time to thoroughly develop the program and extrapolate the needs and appropriate timeline for the project partners, WHRC and DMBO. With the threat of Highly Pathogenic Avian Flu (HPAI) looming by March of 2022, it was unlikely that the banding program would have been able to start in May, which would have put both the completion of my Master's and WHRC's program operations in jeopardy. My estimated costs of resources and the project as a whole were accurate: the costs, outside of the limited WHRC work hours I utilised to conduct meetings or complete certain tasks, remained at zero throughout the entirety of the project.

Challenges

Program Requirements

One unexpectedly challenging dynamic of my practicum was the year-long timespan between when I took the Project Management Course and when I decided to commit to a Practicum Project. Outside of the existing challenges to a Master's program, this gap in time made it difficult to not only refocus my studies, but to shift away from research-based writing and into a more practical form of writing. This also gave time for changes to be made to the Integrated Project Plan (IPP) requirements. There were steps to the development of the IPP that I recall as being repetitive in the original course that, in retrospect, helped to differentiate between objectives, deliverables, and requirements to meet the deliverables. Writing the Project Charter and Scope were at times tough to tease apart from each other because they both involved the general overview, objectives, roles and responsibilities and so on. However, having to write them all out did force me to clearly define each part and gave me space to ask for help at each step of the process.

The IPP is designed from a project management perspective and fulfils the needs of many different types of projects. There were some requirements of it that I found were more

challenging to develop due to the nature of my own project. In some projects you may have many different partners, tools and steps so the necessity of the activity list, sequence dependencies, RACI chart, skills inventory, equipment register is clear. As a project manager who is the sole manager of the project with few partners, lack of need for third party skills, and no extra equipment, I found some of the required features to be laborious and somewhat unnecessary. However, I also understand that explaining why you do not need extra skills or equipment could also be considered a step in the planning process. Overall, with the help of the Project Management course and the associated materials, I think the writing of the IPP has been incredibly useful to the project management process.

Partnerships

When I had the initial thought to combine a full-time job and my pursuit of a Master's degree, I believed the combination, though not without challenges, would be simpler to accomplish than it has proven to be. Lessons learned in the project management course could have been more heavily utilised to avoid experiencing roadblocks down the road. First and foremost, I overestimated the free time and self-discipline I would have to write the deliverables I had set out for this project. Working full-time consumed much of the otherwise available time I would set aside, but it also simply took up a significant amount of brain space that I could have reserved for the project. Instead of paying attention to my practicum deliverables and deadlines, I put my work commitments ahead in my list of priorities. This led to me losing track of time and having deadlines quickly creep up on me. While I understand that the timeline of a Master's practicum may be dictated by the needs of the project partner, it is important to keep your own goals and deadlines at the forefront of your mind. By letting one get ahead of the other, I lost sight of the importance of my Master's degree and allowed related tasks to slip to the wayside. This made the execution of duties for the project and work alike more stressful in the end.

The timeline set out in the integrated project plan was meant to be followed. While in the wake of a global pandemic people do seem to be more flexible, it is best to stick to your original plan as much as possible. The original timeline was planned so that I would have plenty of time to complete the deliverables, even allowing for some flexibility if need be. Though it was listed as a risk in the Project Plan, the threat of HPAI to Wildlife Haven's patients, Wildlife Ambassadors, and overall operations took precedence in April when I had

planned to work on the Banding Agreement and Protocol. The scale and weight of changes in protocols to Wildlife Haven's operations created doubt in whether a banding program could safely begin this spring and decreased the immediacy in the development of the program. I had written myself down as the sole risk owner in case of unforeseen circumstances impacting the development of the banding program, but I should have relied more on the Wildlife Haven team to mitigate the risk of HPAI. This was in part of my personal belief that I was the sole person responsible for the Banding Program, and since it was my Master's project, that no one else could help me develop the program. Being an employee of the project partner, thus, proved to be a challenge because the boundaries between work and Master's were so blurred.

In addition, I was not aware of certain requirements set out by the Natural Resources Institute that would require me to submit my project proposal to the Director of the program about a month ahead of my planned schedule. While I do take responsibility for this oversight, I feel that being as removed as I have been physically from the NRI the last two years has impacted my ability to stay on top of major deadlines. During the short time I was active on campus for the first 6 months of my program, just being in the office and having lunch with your cohort you would hear about the process of adjudication and requirements that had yet to be discussed in courses or meetings with your advisor and committee. As you can see from the Activity List, Milestone Chart and Change Log in the Project Plan, tasks often varied from their planned duration and projected completion dates. As a project manager, you must be flexible and be prepared for these types of changes. I was able to adapt to shifting schedules and the needs of project partners easily as this project was designed to develop the program, but stop short of setting an introductory date and beginning the banding process. If there were roadblocks that arose during this process, the banding program would simply be introduced at a later date with no complications.

I found balancing my time and priorities were the most pressing challenges. There were meetings that I had to conduct during work hours, either with Zoe or Paula Grief of Delta Marsh, and in "spare" moments during my work day I might try to write some of the banding protocol or research paper. This led to feelings of guilt for being paid by my employer to finish aspects of my masters, even though we had discussed this possibility at the beginning of the project and that dynamic ultimately put more stress on the completion

of the project. These boundaries should have been discussed prior to the agreement of an employee taking on a master's project within the same organisation. For future practicum students undertaking a partnership like this, I would recommend clearly exploring the boundaries that will need to be drawn between work-life-school needs being balanced.

Positive Outcomes & Insights

I began my journey at the NRI planning to study the impact of noise on prairie songbirds and have ended up developing a practical program to aid in the conservation efforts of songbirds in Manitoba. The greatest takeaway from this project is knowing the legacy of the banding program for Wildlife Haven. Having experience in banding birds with DMBO before, I know how incredibly skilled and passionate their team is, and how rewarding it is to know the difference that one banded bird's data could make in conservation research. Wildlife Haven is an emerging player in the conservation field of Manitoba with much more potential for the expansion of the banding program to include raptors, waterfowl or shorebirds, as well as the addition of MOTUS GPS tracking equipment to species specific projects. Wildlife Haven will be well set-up to develop their own banding station or install a MOTUS receiving tower down the road if that is something they see the need for.

While working closely with the Project Partner as an employee and student was difficult, I do believe it was beneficial to have the inside perspective and intimate knowledge of the organisation itself in planning the project. It gave me a deeper understanding of the organisation and the confidence to write the proposal and deliverables without requiring further exploratory meetings with Zoe from Wildlife Haven. As an employee I already knew the organisation's needs, objectives, and accessible resources, which ultimately saved time in the planning process and improved the quality of content produced for Wildlife Haven. I was able to find daily inspiration in working my job with the project partner; there was a tangible connection to some of the species this banding program would ultimately be helping because I was seeing the phases of songbird rehabilitative care, including the passion and care the rehabilitators invest in all patients. Finding the motivation to write and complete the practicum was made much easier by the proximity to the project partner. Personally I found difficulty in connecting with the hypothetical project I had initially developed when I was in the Project Management course because it was not a realistic

project in my mind. As soon as I brought the idea of monitoring patients post-survival to Wildlife Haven's management team, I knew that this project would be grounded in reality and would succeed. While not always possible with projects, working with people and organisations you already know and trust can lead to a very thoroughly planned project and help ground the project in a real world environment.

The role of my committee was integral in the evolution of this project. The outcome of this project was intended to be the banding program itself. However, until I met with my committee, I had not thought about what that banding program would mean beyond further insight into the movement and behaviour of Manitoba's birds. With the guidance of the committee, it became clear that the addition of a clear strategy to monitor birds and educate the public, as well as staff and volunteers at Wildlife Haven, would be beneficial to the project. The communications plan and sample social media post included in the protocol support the banding program as a whole; this program can be supported by the community and can further help peoples' understanding of the importance of bird banding. Without projects like this banding program and that of DMBO, the community at large may not be able to as easily connect the birds they see everyday and the importance of ecosystem monitoring as a whole. The post-release monitoring aspect found in the banding protocol was developed after the first committee meeting as a way to further engage the public and get their help in identifying birds they may see. Clear and effective communication with the public is integral to the success of the project; scientists must enlist the help of the public to report and recover bird bands. It was an important reminder from my committee that this project is not just an idea developed at school, but a project that will benefit Wildlife Haven and the community beyond, both researchers and bird watchers alike. I learned that sometimes the "big picture" you have in mind when you first design your project leaves out some stakeholders that may not be obvious at the outset; your big picture may have the potential to be bigger than you think. It is important to plan for the impact of your project beyond its scope and immediate stakeholders.

Closing

I found the Practicum stream to be equally as challenging to my time in the Thesis stream of the NRI, but ultimately was a more rewarding experience overall. One doubt I carried with me during my time in the Thesis stream was that no one would ever read my

work outside of my committee and members of the Faculty of Graduate Studies. Delivering a product to Wildlife Haven that they can use and mould to suit their needs as they evolve and grow as an organisation is incredibly rewarding. Knowing that my Master's Practicum will make a difference in practical conservation efforts is more than I could have wished for coming into the NRI as a graduate student. To be on the forefront of conservation research in Manitoba and to be a part of both Wildlife Haven and the Natural Resources Institute (NRI) has been an honour. I am proud to have forged the development of the banding program and for being one of the first students at the NRI to graduate from the practicum program.

APPENDICES

BACKGROUND INFORMATION REPORT

While there are few studies acknowledging the impact that wildlife rescue centres have on the conservation of wild animals, the potential is there (Pyke and Szabo 2018). Just because there is little research, does not mean there is no role for wildlife rehabilitation in conservation science. On the contrary, there is a wealth of information that wildlife rehabilitation centres can contribute such as population, behavioural and health insights (Pyke and Szabo 2018). For example, long term data collected on wildlife that comes into care at Wildlife Haven can be used to study long-term population dynamics of local species. We may get a record number of intakes for a certain species one year that may tell a greater story of shifting trends or seasonal patterns in where they are living, breeding, or hunting. That information can also then help educate the public on how to more peacefully coexist with these wild animals. In addition, wildlife rehabilitation facilities have the opportunity to provide data to research being conducted on disease monitoring in wildlife such as with ectoparasites (Galloway and Lamb 2018), rabies (Long et al 2020), and heavy metal poisoning (Lodenius and Solonen 2013). Wildlife rehabilitation centres can provide a varied sample size that would otherwise be difficult to achieve with more invasive, disruptive field capture techniques. To this end, bird banding at a wildlife rehabilitation facility would be an effective and worthwhile addition to the conservation science toolkit.

The data provided from bird banding programs can illuminate critical information on bird populations throughout North America. It can help researchers better understand seasonal patterns of habitat use, migratory patterns, demographics (age, sex, population, etc), survivorship, and reproductive behaviours (Sekercioalu 2011, Blake and Loiselle 2002). In the field, banders use varying techniques such as mist nests or live-traps to access the targeted bird population. However, banding birds

on-site while the patient is undergoing veterinary care at Wildlife Haven would not incur any additional stress on the bird. In addition, wildlife rehabilitators dedicate enumerable financial and human resources to discovering the best strategies to improve rehabilitation practices, working to improve patient outcomes and finding innovative solutions to species specific needs. By monitoring patient survival post-release, we can assess whether changes should be made to our rehabilitation program based on the data we generate (Koenig et al 2002). By banding birds in conjunction with Delta Marsh, we will be able to not only monitor survival success of the avian patients, but compare the data with the control group of wild birds that are banded at Delta Marsh. While this data will not be without biases, it will give an indication of whether birds treated at the wildlife rehabilitation facility are as likely to survive as wild birds of the same species.

The introduction of a bird banding program at Wildlife Haven will not only result in valuable insight to our own rehabilitation program, but it will benefit the research community and our existing education program in helping reveal more about wildlife native to Manitoba. Bird species are an approachable learning platform for the greater community to engage with as they are easy to monitor, charismatic, and can be found in peoples' backyards (Sekercioalu 2012). With the addition of a banding program, we can then teach people about the importance of monitoring wildlife and how they can engage in their own backyard monitoring through citizen science initiatives, like eBird. By integrating community involvement and outreach, we can attract more support and interest in our own conservation efforts (Sekercioalu 2012).

While this is a brief introduction, the deliverable of the literature review as a part of this practicum will investigate more extensively the impact of wildlife rehabilitation on local ecosystems; the importance of bird banding programs; how these two institutions can work together and the outcomes they may produce. It will provide a more broad view of these research questions with the end goal of learning more about how Wildlife

Haven can contribute to conservation science through its banding program. Likely sources and databases include the National Wildlife Rehabilitators Association bulletin, Birds of the World database, and Web of Science. I anticipate the literature review will be between 35 and 40 pages. This research will then be available to Wildlife Haven as material they can use for grant applications or in their own communications strategies. We hope that this banding program will develop into a long-term partnership between Wildlife Haven and Delta Marsh Observatory that will grow beyond the scope of this project proposal.

The draft agreement will require a meeting with Zoe Nakata to establish the goals and terms of Wildlife Haven. I will then meet with Paula Grief to establish the goals and terms of Delta Marsh Observatory. Following those meetings, I will write the draft agreement on behalf of both parties. We will then meet altogether to go over the agreement and discuss any changes that they will want to make. As previously stated in the Risk Management section, I do not anticipate any barriers to this process. We will not require any legal involvement as this is a draft agreement that Wildlife Haven and Delta Marsh Observatory can make as formal and official as they would like. That is outside the scope of this project.

References

Blake, John G., and Bette A. Loiselle. "Manakins (Pipridae) in Second-Growth and Old-Growth Forests: Patterns of Habitat Use, Movement, and Survival." *The Auk*, vol. 119, no. 1, *The American Ornithologists' Union*, 2002, pp. 132–48, <https://doi.org/10.1093/auk/119.1.132>.

Galloway, Terry D., and Robert J. Lamb. "Chewing Lice (Phthiraptera: Amblycera and Ischnocera) Infesting Woodpeckers and Sapsuckers (Aves: Piciformes: Picidae) in Manitoba, Canada." *The Canadian Entomologist*, vol. 148, no. 5, 2016, pp. 520–531., doi:10.4039/tce.2015.89.

Koenig, J., Shine, R., & Shea, G. (2002). The Dangers of Life in the City: Patterns of Activity, Injury and Mortality in Suburban Lizards (*Tiliqua scincoides*). *Journal of Herpetology*, 36(1), 62–68.

<https://doi.org/10.2307/1565803>

Lodenius, Martin, and Tapio Solonen. “The Use of Feathers of Birds of Prey as Indicators of Metal Pollution.” *Ecotoxicology (London)*, vol. 22, no. 9, Springer US, 2013, pp. 1319–34,

<https://doi.org/10.1007/s10646-013-1128-z>.

Pyke, G.H. and Szabo, J.K. (2018), Conservation and the 4 Rs, which are rescue, rehabilitation, release, and research. *Conservation Biology*, 32: 50-59. <https://doi-org.uml.idm.oclc.org/10.1111/cobi.12937>

Table 1. *Total Songbirds Treated at Wildlife Haven by Species January 1, 2017 - August 4, 2022*

Common Name	Number
	Treated (Sum)
Alder Flycatcher	2
American Crow	446
American Goldfinch	32
American Redstart	6
American Robin	299
American Yellow Warbler	1
Baltimore Oriole	19
Barn Swallow	76
Bay Wren	4
Bay-breasted Warbler	1
Black-and-white Warbler	5
Black-billed Magpie	14
Black-capped Chickadee	39
Blackpoll Warbler	1
Blue Jay	152
Blue-headed Vireo	3
Bohemian Waxwing	6
Brewer's Blackbird	2
Brown Creeper	5
Brown-headed Cowbird	12
Canada Warbler*	2
Cape May Warbler	2
carolina wren	5
Cedar Waxwing	46
Chimney Swift*	12
Chipping Sparrow	124
Clay-coloured Sparrow	1
Cliff Swallow	8
Common Grackle	173
Common Nighthawk*	51

Common Raven	79
Common Redpoll	12
Common Yellowthroat	3
Dark-eyed Junco	46
Downy Woodpecker	44
Eastern Bluebird	5
Eastern Kingbird	7
Eastern Phoebe	10
Eastern Whip-poor-will	3
European Starling	106
Fox Sparrow	6
Golden-crowned Kinglet	2
Gray Catbird	2
Great Crested Flycatcher	1
Grey Catbird	1
Grey Jay	1
Grey-cheeked Thrush	2
Hairy Woodpecker	16
Harris's Sparrow*	2
Hermit Thrush	2
House Finch	37
House Sparrow	417
House Wren	58
Lapland Longspur	1
Least Flycatcher	3
Magnolia Warbler	2
Magpie	4
Mourning Warbler	1
Nashville Warbler	4
Northern Flicker	89
Northern Shrike	2
Northern Waterthrush	1
Olive-sided Flycatcher*	3
Orange-crowned Warbler	9

Orchard Oriole	1
Ovenbird	7
Palm Warbler	4
Pileated Woodpecker	17
Pine Grosbeak	17
Pine Siskin	13
Pine Warbler	3
Purple Finch	7
Purple Martin	86
Raven	4
Red Crossbill	2
Red-breasted Nuthatch	3
Red-eyed Vireo	16
Red-headed Woodpecker*	1
Red-winged Blackbird	15
Rose-breasted Grosbeak	18
Ruby-crowned Kinglet	6
Ruby-throated Hummingbird	25
Savannah Sparrow	11
Scarlet Tanager	1
Semipalmated Sandpiper	1
Song Sparrow	1
Swainson's Thrush	67
Swamp Sparrow	4
Tennessee Warbler	19
Three-toed Woodpecker	1
Tree Swallow	12
Unidentified Songbird	1
Warbling Vireo	3
Western Kingbird	2
Western Meadowlark	3
White-breasted Nuthatch	17
White-crowned Sparrow	5
White-throated Sparrow	19

White-winged Crossbill	2
Wilson's Warbler	2
Yellow Warbler	7
Yellow-bellied Flycatcher	2
Yellow-bellied Sapsucker	111
Yellow-headed Blackbird	2
Yellow-rumped Warbler	23
Yellow-throated Vireo	1
Grand Total	3092

*i indicates a species listed under the Endangered Species and Ecosystems Act of Manitoba

Table 2. *Average Days Spent in Care by Species at WHRC January 1, 2017 - August 4, 2022*

Common Name	Days in Care (Average)
Alder Flycatcher	9
American Crow	11.5
American Goldfinch	8
American Redstart	4
American Robin	15
American Yellow Warbler	1
Baltimore Oriole	8
Barn Swallow	8
Bay Wren	1
Bay-breasted Warbler	1
Black-and-white Warbler	1
Black-billed Magpie	6
Black-capped Chickadee	6
Blackpoll Warbler	4
Blue Jay	11
Blue-headed Vireo	1
Bohemian Waxwing	13
Brewer's Blackbird	1
Brown Creeper	1
Brown-headed Cowbird	104
Canada Warbler	1
Cape May Warbler	9
carolina wren	1
Cedar Waxwing	11
Chimney Swift	11
Chipping Sparrow	6
Clay-coloured Sparrow	1
Cliff Swallow	10
Common Grackle	20
Common Nighthawk	2

Common Raven	10
Common Redpoll	5
Common Yellowthroat	1
Dark-eyed Junco	44
Downy Woodpecker	3
Eastern Bluebird	4
Eastern Kingbird	9
Eastern Phoebe	30
Eastern Whip-poor-will	1
European Starling	10
Fox Sparrow	4
Golden-crowned Kinglet	8
Gray Catbird	1
Great Crested Flycatcher	1
Grey Catbird	7
Grey Jay	1
Grey-cheeked Thrush	162
Hairy Woodpecker	6
Harris's Sparrow	1
Hermit Thrush	3.5
House Finch	10
House Sparrow	12
House Wren	5
Lapland Longspur	14
Least Flycatcher	10
Magnolia Warbler	2
Magpie	1
Mourning Warbler	1
Nashville Warbler	1
Northern Flicker	5
Northern Shrike	1
Northern Waterthrush	3
Olive-sided Flycatcher	9
Orange-crowned Warbler	2

Orchard Oriole	1
Ovenbird	2
Palm Warbler	1
Pileated Woodpecker	6
Pine Grosbeak	300
Pine Siskin	8
Pine Warbler	1
Purple Finch	6
Purple Martin	3
Raven	1
Red Crossbill	3
Red-breasted Nuthatch	1
Red-eyed Vireo	4
Red-headed Woodpecker	1
Red-winged Blackbird	3
Rose-breasted Grosbeak	49
Ruby-crowned Kinglet	1.5
Ruby-throated Hummingbird	2
Savannah Sparrow	2.5
Scarlet Tanager	1
Semipalmated Sandpiper	1
Song Sparrow	2
Swainson's Thrush	4
Swamp Sparrow	3.5
Tennessee Warbler	2
Three-toed Woodpecker	1
Tree Swallow	6.5
Unidentified Songbird	1
Warbling Vireo	13
Western Kingbird	21
Western Meadowlark	1
White-breasted Nuthatch	4
White-crowned Sparrow	3
White-throated Sparrow	2

White-winged Crossbill	1.5
Wilson's Warbler	1
Yellow Warbler	2.5
Yellow-bellied Flycatcher	4
Yellow-bellied Sapsucker	28
Yellow-headed Blackbird	3
Yellow-rumped Warbler	2.5
Yellow-throated Vireo	1
Grand Total	14

Table 3. Outcome of Patient Stay at WHRC by Disposition and Species from January 1, 2017-August 4, 2022

Disposition	Dead on arrival	Died +24hr	Died in 24hr	Euthanized +24hr	Euthanized in 24hr	Pending	Released	Transferred	Grand Total
Common Name	Number Treated (Sum)								
Alder Flycatcher							2		2
American Crow	44	51	45	35	206	2	63		446
American Goldfinch	3	6	4		6		13		32
American Redstart	3	2					1		6
American Robin	21	21	24	19	107	4	103		299
American Yellow Warbler							1		1
Baltimore Oriole	2	3	2	1	5		6		19
Barn Swallow	6	13	6	4	18		29		76
Bay Wren	4								4
Bay-breasted Warbler	1								1
Black-and-white Warbler	1		3		1				5
Black-billed Magpie	1		1	1	7		4		14
Black-capped Chickadee	5	9	9	2	8		6		39
Blackpoll Warbler		1							1
Blue Jay	5	18	20	12	55	5	37		152
Blue-headed Vireo	1				1		1		3
Bohemian Waxwing	1		1		2		2		6
Brewer's Blackbird					2				2
Brown Creeper	2		2				1		5
Brown-headed Cowbird		1	2	2	2		5		12
Canada Warbler			1				1		2
Cape May Warbler		2							2
carolina wren					5				5
Cedar Waxwing	2	4	4	4	10	3	19		46
Chimney Swift				1	4			7	12

Chipping Sparrow	11	20	25	3	34	2	29		124
Clay-coloured Sparrow					1				1
Cliff Swallow		1			1		6		8
Common Grackle	16	19	10	16	66		46		173
Common Nighthawk	2	2	1	6	36		4		51
Common Raven	1	4	2	12	48		12		79
Common Redpoll	2	1			3		6		12
Common Yellowthroat			2		1				3
Dark-eyed Junco	2	8	8	5	17		6		46
Downy Woodpecker	2	13	8	1	10	1	9		44
Eastern Bluebird		1	1		2		1		5
Eastern Kingbird		2	1	1			3		7
Eastern Phoebe		2	1		1		6		10
Eastern Whip-poor-will			1		1		1		3
European Starling	9	7	4	4	40		42		106
Fox Sparrow		3		1	1		1		6
Golden-crowned Kinglet			1				1		2
Gray Catbird	1				1				2
Great Crested Flycatcher		1							1
Grey Catbird							1		1
Grey Jay					1				1
Grey-cheeked Thrush				1		1			2
Hairy Woodpecker		6	2		5		3		16
Harris's Sparrow					2				2
Hermit Thrush		2							2
House Finch	5	7	3		14	4	4		37
House Sparrow	38	35	44	11	179		110		417
House Wren	3	12	5	1	29		8		58
Lapland Longspur							1		1
Least Flycatcher		1			1		1		3
Magnolia Warbler		1			1				2
Magpie	2		1		1				4
Mourning Warbler		1							1

Nashville Warbler		3	1						4
Northern Flicker	5	13	6	18	30		17		89
Northern Shrike			1		1				2
Northern Waterthrush		1							1
Olive-sided Flycatcher			1		1		1		3
Orange-crowned Warbler	1	2	4				2		9
Orchard Oriole			1						1
Ovenbird		2	1	1	2	1			7
Palm Warbler		1			1		2		4
Pileated Woodpecker	1	2	2		6		6		17
Pine Grosbeak	1	1	3	3	3		6		17
Pine Siskin			5	1	3		4		13
Pine Warbler	1	2							3
Purple Finch			1		2		4		7
Purple Martin	5	1	4	1	65	1	9		86
Raven			1		3				4
Red Crossbill					1		1		2
Red-breasted Nuthatch	1	1	1						3
Red-eyed Vireo	1	5	2	1	5		2		16
Red-headed Woodpecker					1				1
Red-winged Blackbird		3	5		6		1		15
Rose-breasted Grosbeak	1		3	2	4		8		18
Ruby-crowned Kinglet	1		4				1		6
Ruby-throated Hummingbird	1	2	1	4	15		2		25
Savannah Sparrow		2			7	1	1		11
Scarlet Tanager					1				1
Semipalmated Sandpiper					1				1
Song Sparrow		1							1
Swainson's Thrush	6	13	6	3	21		18		67
Swamp Sparrow		1	2				1		4
Tennessee Warbler	2	5	3		4		5		19

Three-toed Woodpecker		1							1
Tree Swallow	1	1			5		5		12
Unidentified Songbird					1				1
Warbling Vireo	1						2		3
Western Kingbird						1	1		2
Western Meadowlark	1		1		1				3
White-breasted Nuthatch	2	2	6		5		2		17
White-crowned Sparrow		1			3		1		5
White-throated Sparrow	1	1	3	2	9		3		19
White-winged Crossbill	1						1		2
Wilson's Warbler		1	1						2
Yellow Warbler	1	1	2		2		1		7
Yellow-bellied Flycatcher	1						1		2
Yellow-bellied Sapsucker	5	25	8	16	27	1	29		111
Yellow-headed Blackbird				1	1				2
Yellow-rumped Warbler	2	2	5		9		5		23
Yellow-throated Vireo	1								1
Grand Total	240	376	328	196	1181	27	737	7	3092

Table 4. Master List of Banded Birds at WHRC

Patient Number	Date Banded	Species	Band Number	Release Date	Release Location	Coordinates
22-564	22/07/08	AMRO	1873-164 01	22/07/08	103 Wisteria Way	(49.9559571N, 97.1130418W)
22-601	22/07/08	AMRO	1873-164 02	22/07/08	103 Wisteria Way	(49.9559571N, 97.1130418W)
22-606	22/07/08	AMRO	1873-164 03	22/07/08	103 Wisteria Way	(49.9559571N, 97.1130418W)
22-864	22/07/08	AMRO	1232-069 01	22/07/21	1095 St. Anne's Rd	(49.8165577N, 97.0754461W)
22-892	22/07/08	AMRO	1232-069 02	22/07/26	WHRC	(49.72319N, 96.98257W)
22-866	22/07/08	AMRO	1232-069 03	22/07/26	WHRC	(49.72319N, 96.98257W)
22-865	22/07/08	AMRO	1232-069 04	22/07/21	1095 St. Anne's Rd	(49.8165577N, 97.0754461W)
22-831	22/07/08	AMRO	1232-069 05	22/07/21	1095 St. Anne's Rd	(49.8165577N, 97.0754461W)
22-721	22/07/08	AMRO	1232-069 06	22/07/26	WHRC	(49.72319N, 96.98257W)
22-911	22/07/08	HAWO	1232-069 07	22/07/27	Assiniboine Trail, St Francis	(49.908516N, 97.5387937W)
22-732	22/07/08	CHSP	2960-399 01	22/07/08	WHRC	(49.72319N, 96.98257W)
22-733	22/07/08	CHSP	2960-339 02	22/07/08	WHRC	(49.72319N, 96.98257W)
22-622	22/07/21	MODO	1593-884 01			
22-849	22/07/21	BLJA	1232-069 09	22/08/05	1095 St. Anne's Rd	(49.8165577N, 97.0754461W)
22-850	22/07/21	BLJA	1232-069 08	22/08/05	1095 St. Anne's Rd	(49.8165577N, 97.0754461W)
22-860	22/07/21	BLJA	1873-164 06	22/08/05	1095 St. Anne's Rd	(49.8165577N, 97.0754461W)
22-851	22/07/21	BLJA	1873-164 05			
22-1005	22/07/21	TRES	2871-299 02	22/07/24	Birds Hill Park	(50.010157N, 96.890653W)

22-1006	22/07/21	TRES	2871-299 03	22/07/24	Birds Hill Park	(50.010157N, 96.890653W)
22-1007	22/07/21	TRES	2871-299 01	22/07/24	Birds Hill Park	(50.010157N, 96.890653W)
22-980	22/07/21	HOFI	2691-748 04	22/07/22	103 Wisteria Ave	(49.9559537N, 97.1108531.17W)
22-982	22/07/21	HOFI	2691-748 03	22/07/22	103 Wisteria Ave	(49.9559537N, 97.1108531.17W)
22-983	22/07/21	HOFI	2691-748 02	22/07/22	103 Wisteria Ave	(49.9559537N, 97.1108531.17W)
22-984	22/07/21	HOFI	2691-748 01	22/07/22	103 Wisteria Ave	(49.9559537N, 97.1108531.17W)
22-1047	22/07/21	COGR	1873-164 04	22/07/28	WHRC	(49.72319N, 96.98257W)
22-1294	22/08/01	DOWO	2691-748 05	22/08/10	St Vital Park	(49.8299782N, 97.1324333W)
22-1067	22/08/01	BARS	2871-299 06	22/08/02	Oak Hammock Marsh	(50.1875N, 97.1250W)
22-1178	22/08/01	BARS	2871-299 05	22/08/02	Oak Hammock Marsh	(50.1875N, 97.1250W)
22-1180	22/08/01	BARS	2871-299 08	22/08/02	Oak Hammock Marsh	(50.1875N, 97.1250W)
22-1181	22/08/01	BARS	2871-299 07	22/08/02	Oak Hammock Marsh	(50.1875N, 97.1250W)
22-1182	22/08/01	BARS	2871-299 04	22/08/02	Oak Hammock Marsh	(50.1875N, 97.1250W)
22-1214	22/08/01	WEKI	2641-069 01	22/08/09	80091 Two Mile Road, East Selkirk	(50.189018N, 96.799100W)
22-1193	22/08/01	BLJA	1873-164 07			
22-1258	22/08/16	AMRO	1232-069 10	22/08/16	1143 St Anne's Rd	(49.8158302N, 97.0733466W)
22-1259	22/08/16	AMRO	1232-069 11	22/08/16	1143 St Anne's Rd	(49.8158302N, 97.0733466W)

INTERESTED PARTIES REGISTER

Name	Role	Responsibilities and Contribution	Expectations of Project Manager	Why do they care?	Implications to Relationship Management
Kathryn Gibb	Project Manager	Develop and execute project plan. Responsible for communication between project partners. Responsible for completion of deliverables.		As a member of the Wildlife Haven management team, I am invested in the future of the organisation, as well as striving to graduate at the end of 2022.	
Nicola Koper	Student Advisor	Guide the overall process of the project. Act as project resource. Sign off on all practicum progress documents. Sit on MNRM practicum committee.	Completion of all MNRM practicum requirements. Completion of MRNM coursework. Maintains communication with project members and committee.	This project relates to her work on the impact of humans on prairie songbirds. She wants me to graduate within the four year program stipulation.	

<p>Zoe Nakata</p>	<p>Project Partner/Sponsor</p>	<p>Guide project direction. Oversee the development of documents, including permits. Ensure Wildlife Haven's needs are met. Sign off on all FGS documents. Sit on MRNM practicum committee.</p>	<p>Works with her to produce the agreement and banding protocol to suit Wildlife Haven's standards. Notification of project developments or meetings. Notification of meetings related to the committee. Inclusion in committee related correspondence.C ontinues to do paid job as well as Masters program.</p>	<p>She is the Executive Director of Wildlife Haven and as such is deeply invested in the future direction of the organisation. Getting the Centre more integrated in the scientific community could lead to other opportunities in the future.</p>	
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Paula Grief	Project Partner	Act as project resource. Submit permit to band. Provide banding materials and expertise. Bands birds.	Works with her to produce the agreement and banding protocol to suit Delta Marsh's standards. Notification of meetings and relevant project development from Wildlife Haven.	She runs a very successful banding program through Delta Marsh; the success of this program will ultimately (positively) reflect on her as well. Her interest in migratory research and the health of avian populations.	
Kevin Fraser	Committee Member	Guide project direction. Act as project resource. Sit on MNRM practicum committee.	Notification of meetings related to the committee. Inclusion in committee related correspondence.	He is a prominent migratory bird researcher. As a committee member, he is rooting for project success as well.	

Sheldon McLeod	Committee Member	Guide project direction. Act as project resource. Sit on MNRM practicum committee.	Notification of meetings related to the committee. Inclusion in committee related correspondence.	Sheldon has been a source of guidance for the terms of the practicum documents already and wants the project to be successful as he is invested both as a committee member but as a fan of Wildlife Haven.	
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TIMELINE

	2020		2022						
	D	J	F	M	A	M	J	J	A
Project management course and MRNM coursework complete									
Project Charter Agreement (Koper, Nakata)									
Project Plan Meeting (Koper, Nakata)									
Permit Approval									
Project Plan Approval (Koper, Nakata, Fraser)									
Practicum Project Work (banding protocol, draft agreement)									
Practicum Project Work (literature review)									
Complete Project Deliverables									
Approval of Practicum for Adjudication (Koper, Nakata, Fraser)									

I plan to adjudicate my practicum in August of 2022. Though this timeline may be subject to changes, I believe it reflects the best course of action in order to complete my practicum project within the next 7 months.

Planning Estimates

I am aiming to complete the documents necessary to complete the objective of creating a formal partnership between Wildlife Haven and Delta Marsh by April 2022, which would include the banding protocol and draft agreement. This would leave the literature review to be completed ahead of the final project reflection and submission in August of 2022.

If the Permit to Capture and Band Migratory Birds is approved, banding protocol completed and draft agreement signed by April of 2022, the two parties (Wildlife Haven and Delta Marsh) could then presumably begin their banding program during the summer of 2022.

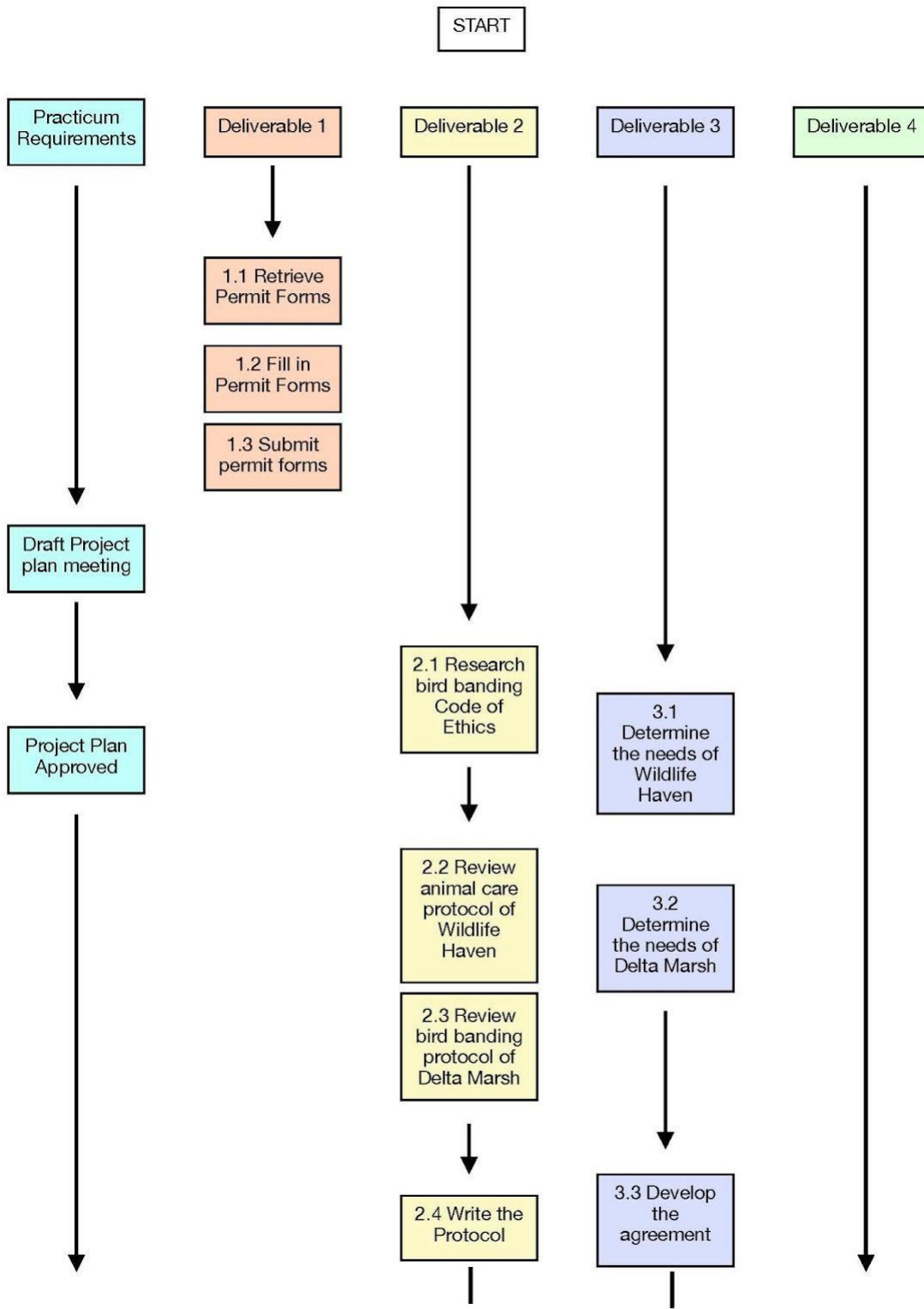
ACTIVITY LIST

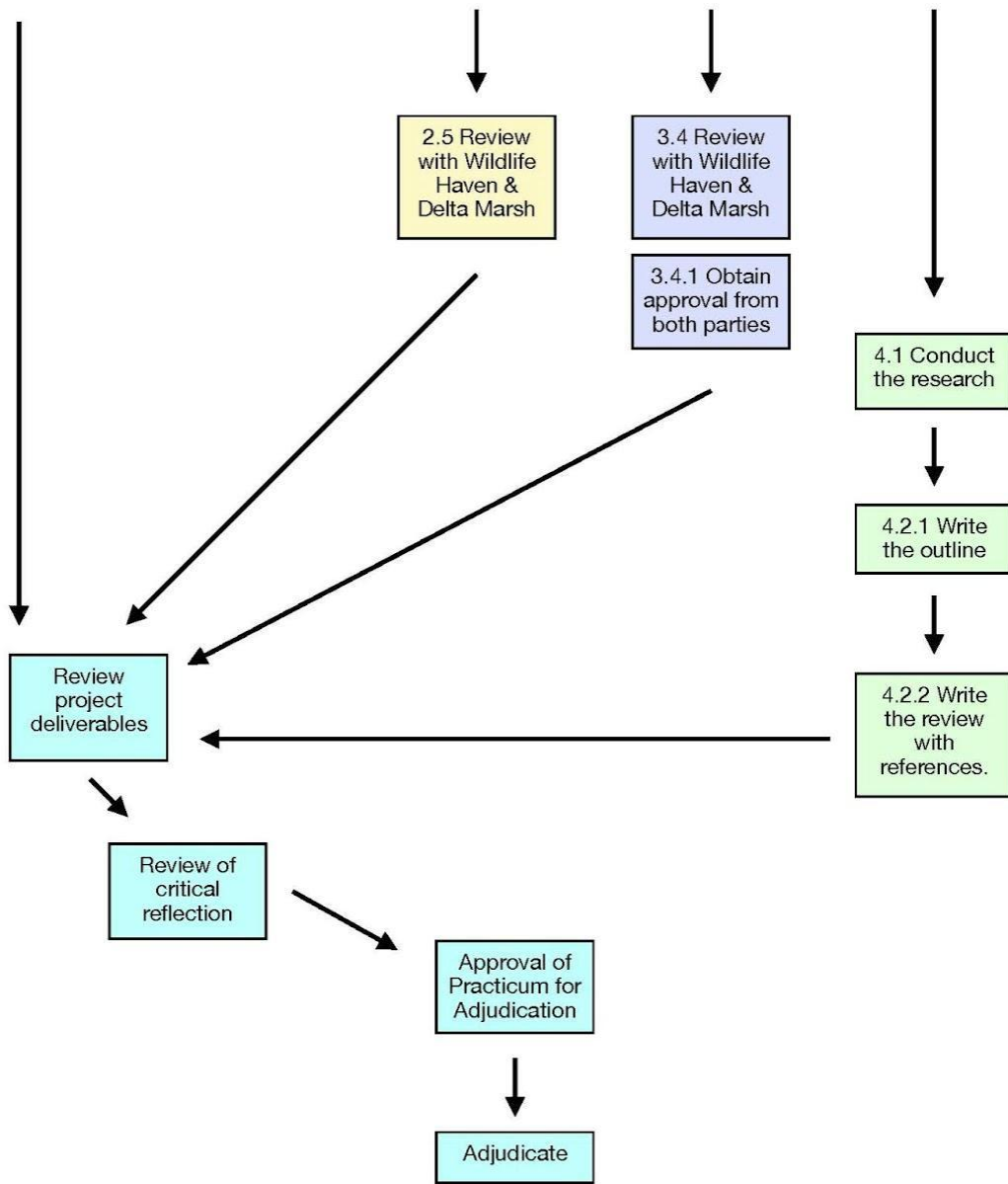
WBS #	Deliverable	Activity	Comments	Duration	Initiation Date	Completion Date	Actual Duration
1.1	Scientific Permit to Capture and Band Migratory Birds allowing Wildlife Haven to band birds.	Retrieve permit forms	Completed previous to project plan approval due to time constraints of submission date.	1 email	Nov 26	Nov 26, 2021	1 email
1.2		Fill in permit forms		3 hours		Dec 8, 2021	3 hours
1.3		Submit permit forms		1 email		Dec 10, 2021	1 email
2.1	Banding protocol document in conjunction with Paula Grief and Zoe Nakata.	Research bird banding Code of Ethics.		1 week	April 24	April 24	1 day

2.2		Review animal care protocol of Wildlife Haven.		1 week	April 24	April 24	1 hour
2.3		Review bird banding protocol of Delta Marsh.		1 week	April 24	April 24	1 day
2.4.1		Write outline of protocol.		5 days	April 25	April 27	2 days
2.4.2		Write the protocol.		2 weeks	April 27	May 23	1 month
2.5		Review with Wildlife Haven & Delta Marsh.		1 meeting			
3.1	Draft partnership agreement between Wildlife Haven and Delta Marsh	Determine the needs of Wildlife Haven.		1 meeting	March 16	March 16	1 meeting

	Bird Observatory.						
3.2		Determine the needs of Delta Marsh.		1 meeting	March 21	March 21	1 meeting
3.3		Develop the agreement.		2 weeks	April 13	April 29	2 weeks
3.4		Review with Wildlife Haven & Delta Marsh.		1 meeting			
3.4.1		Obtain approval from both parties.		1 meeting			
4.1	Research Paper	Conduct the research.		4 weeks	May 16	June 16	4 weeks
4.2.1		Write the outline.		5 days	May 24	May 27	3 days
4.2.2		Write the review with references.		6 weeks	May 29	June 16	2 weeks

SEQUENCE NETWORK DIAGRAM





MILESTONE CHART

Milestone	Expected Completion Date	Actual Completion Date	Comments
Scientific Permit to Capture and Band Migratory Birds approved	Jan 31 2022	March 2022	
Minimal Animal Involvement Form approved	Jan 31 2022	Feb 14 2022	
Project plan approved	Feb 15 2022	Feb 16 2022	
Banding protocol approved	April 15 2022	June 1 2022	
Draft partnership agreement approved	April 15 2022	May 23 2022	
Approval of final practicum document	July 15 2022		
Adjudication	August 2022		

RESPONSIBILITY ASSIGNMENT MATRIX (RACI)

ID	Activity	Kathryn	Nicola Koper	Zoe Nakata	Paula Grief	Kevin Fraser	Sheldon McLeod
1.1	Retrieve permit forms.	R/A					
1.2	Fill in permit forms.	R/A					
1.3	Submit permit forms.	A	I	I	R		
2.1	Research bird banding Code of Ethics.	R/A	C		C		
2.2	Review animal care protocol of Wildlife Haven.	R/A		C			
2.3	Review bird banding protocol of Delta Marsh.	R/A			C		
2.4.1	Write outline	R/A	C				
2.4.2	Write review	R/A		C			

2.5	Review with Wildlife Haven & Delta Marsh.	A	C	C	C	I	
3.1	Determine the needs of Wildlife Haven.	R/A		C			
3.2	Determine the needs of Delta Marsh.	R/A			C		
3.3	Develop the agreement.	R/A	C	C	C		
3.4.1	Obtain approval from both parties.	A	I	R	R	I	
4.1	Research	R/A	C	C	C	C	
4.2.1	Write outline	R/A	C				
4.2.2	Write review with references	R/A	C				

SKILLS INVENTORY

Person	Job Title	Skills/training	Years	Education
Kathryn Gibb	Project Manager	Writing, Communication	12 approx	Undergraduate degree, MRNM coursework, job experience
Paula Grief	Resident Naturalist	Master Bander - banding expert	24	University, Master Banding Certification
Kevin Fraser	Assistant Professor, University of Manitoba	Songbird Migration Expert	N/A	N/A

PROBABILITY AND IMPACT MATRIX

Risk Number	Risk	Probability	Impact	Risk Score
1	Wildlife Haven does not get approved for the Scientific Permit to Capture and Band Migratory Birds	0.2	0.8	0.16
2	Wildlife Haven and Delta Marsh Observatory cannot agree on the details of the agreement	0.05	0.8	0.04
3	Banding program initiation is delayed due to unforeseen circumstances.	0.2	0.6	0.12
4	Project Proposal is not approved by committee.	0.2	0.5	0.1
5	Deliverables are not acceptable to the adjudication committee	0.2	0.6	0.12
6	Abbreviated Protocol for Minimal Animal Involvement form is not accepted	0.2	0.4	0.08

RISK REGISTER

Risk #	Risk Name	Response Plan (Y/N)	Location	Risk Owner	Status
1	Wildlife Haven does not get approved for the Scientific Permit to Capture and Band Migratory Birds.	Y	Risk Management Plan	Kathryn, Zoe Nakata	Avoided
2	Wildlife Haven and Delta Marsh Observatory cannot agree on details of the agreement.	Y	Risk Management Plan	Kathryn	Avoided
3	Banding program initiation is delayed due to unforeseen circumstances.	Y	Risk Management Plan	Kathryn	Program was delayed due to a late spring and impact of HPAI on bird admissions at WHRC. Start date of program delayed by WHRC.

4	Project Proposal is not approved by committee.	Y	Quality Management Plan	Kathryn	Avoided
5	Deliverables are not acceptable to the adjudication committee.	Y	Quality Management Plan	Kathryn	Pending
6	Abbreviated Protocol for Minimal Animal Involvement form is not accepted.	Y	Risk Management Plan	Kathryn, Nicola Koper	Avoided

WORK BREAKDOWN STRUCTURE

1. Scientific Permit to Capture and Band Migratory Birds allowing Wildlife Haven to band birds and Abbreviated Protocol for Minimal Animal Involvement form in January 2022.
 1. Retrieve permit forms.
 2. Fill in permit forms.
 3. Submit permit forms.
2. Banding protocol document in conjunction with Paula Grief and Zoe Nakata by April 2022.
 1. Research bird banding Code of Ethics.
 2. Review animal care protocol of Wildlife Haven.
 3. Review bird banding protocol of Delta Marsh.
 4. Compose protocol.
 1. Write outline
 2. Write protocol
 5. Review with Wildlife Haven & Delta Marsh.
3. Draft partnership agreement between Wildlife Haven and Delta Marsh Bird Observatory by April 2022.
 1. Determine the needs of Wildlife Haven.
 2. Determine the needs of Delta Marsh.
 3. Develop the agreement.
 4. Review with Wildlife Haven & Delta Marsh.
 1. Obtain approval from both parties.
4. Literature review researching why banding is necessary within the scope of wildlife rehabilitation by June 2022.
 1. Conduct research
 2. Write
 1. Outline
 2. Write review with references

CHANGE LOG

Change ID	Change Description	Submit Date	Comments	Approve/Reject	Implementation Date
1	Addition of promotions plan for project	February 14 2022	Committee requested an in-depth promotions plan to be included in the protocol to clarify how this project would be communicated to the public as well as to organisation staff/volunteers. Later added to IPP as well as protocol (June 2022)	Approve	May 19 2022
2	Addition of Post-Release Monitoring Plan	February 14 2022	Committee requested an in-depth plan that will lay out how post-release survival will be monitored in the short-term because only 1% of bands are ever recovered from banded birds	Approve	May 23 2022

3	Project Timeline Moved Up	May 15 2022	Dr Koper sent an email to her students with a timeline of her summer schedule, and it became clear that this project must be submitted a month before previously planned. The research paper process had not yet begun so that timeline had to be shortened in order to meet the submission deadline.	Approve	May 15 2022
4					

BIRD BANDING SESSION REPORTS

BANDING REPORT

July 8, 2022

Paula Grief and Meredith Stoesz from DMBO banded 12 of the first Wildlife Haven songbird patients. All banding was completed outdoors and it was exciting to enter their banding information and morphometrics into WRMD. A few key lessons were learned that will help improve the efficiency of the process and improve the welfare of the birds throughout the process. To better prepare for future banding sessions, we will have a pre-prepared kit with a net, scale, clipboard to take notes, and a small table to band in the hallway of the enclosure itself. It will be kept in the Intake Office for ease of access.

The sun was already very hot at 9am in the morning, so we aimed to band birds in the shade. This meant we had to take the COGRs out of their enclosure's structure entirely and band at a table outside in the shade. While there were no issues doing this with the COGRs, that was not true with the rest of the birds. We ended up with a table too large to fit in the hallway of the enclosure structure that housed the AMROs, HAWO and CHSPs and so we had to band outside of the structure again. Angie and Kathryn caught the AMROs and held them while Paula and Meredith banded. The plan was that once they were banded, we put them into a crate outside until they were all banded and could be returned at the same time into their enclosure. However, one robin was able to escape while another was being placed back into the carrying crate. The CHSP were in a reptarium within a room inside of the outdoor enclosure. One escaped the reptarium before it could be banded and was able to slip through the chainlink of the enclosure itself. The CHSPs were scheduled to be released so we were not concerned about the welfare of the bird once it had escaped, however the AMROs needed to remain in care a couple of weeks longer. Luckily, the banded AMRO that had escaped ended up hanging around the site that day and was able to be recaptured to continue its rehabilitative care.

As cautious as we were to handle the birds as little as possible, we'd like to take care to catch up the patients before the banding begins to save time, as well as to be able to release the birds right back into the comfort and safety of their enclosure directly instead of a carrying crate after banding. We understand that this process may be stressful for the birds and will continue to find ways to eliminate those stressors as much as possible.

SPECIES	PATIENT NUMBER	BAND NUMBER	Disposition
COGR	22-564	1873-16401	Released
COGR	22-601	1873-16402	Released
COGR	22-606	1873-16403	Released
AMRO	22-864	1232-06901	Pending
AMRO	22-892	1232-06902	Pending
AMRO	22-866	1232-06903	Pending
AMRO	22-865	1232-06904	Pending
AMRO	22-831	1232-06905	Pending
AMRO	22-721	1232-06906	Pending
HAWO	22-911	1232-06907	Pending
CHSP	22-732	2960-39901	Released
CHSP	22-733	2960-33902	Released