**Protocol Review Application**

**for the Use of Animals in**

**Research and Teaching**

**Animal Care Committee**

500 University Dr.

Whitehorse, YT Y1A 5K4

867-668-8857

vwalker@yukonu.ca

**INSTRUCTIONS:**

Complete this form electronically and attach all supporting materials. Answer all questions, even if the information is duplicated elsewhere in the application. Submit the completed form as a **single document** (.doc) to the Animal Care Committee (ACC) Coordinator at vwalker@yukonu.ca. If electronic submission is not possible please contact the ACC Coordinator.

**\*\*\* YOUR APPLICATION WILL NOT BE REVIEWED BY THE ACC UNTIL ALL NECESSARY DOCUMENTS HAVE BEEN RECEIVED BY THE ACC COORDINATOR\*\*\***

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| **ANIMAL CARE COMMITTEE USE ONLY**

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| Protocol #       | **Consult the Canadian Council on Animal Care (CCAC) *Guide to Care and Use of Experimental Animals, Ethics of Animal Investigation*, and pertinent guidelines before completing this form.** **These documents are available from the CCAC web site (**[**http://www.ccac.ca**](http://www.ccac.ca/)**).** |
| Date Approved: Click here to enter a date. |
| Principal Investigator            |

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The following is the mission statement of the Canadian Council on Animal Care (CCAC):

*"The purpose of the Canadian Council on Animal Care is to act in the interests of the people of Canada to ensure through programs of education, assessment and persuasion that the use of animals, where necessary, for research, teaching and testing employs optimal physical and psychological care according to acceptable scientific standards, and to promote an increased level of knowledge, awareness and sensitivity to relevant ethical principles."*

The Animal Care Committee (ACC) at Yukon University is charged with the responsibility of ensuring that all use of animals proceeds according to the standards established by the CCAC.

This form is intended to help animal users at Yukon University communicate, in an orderly fashion, relevant information to the ACC in order to facilitate approval of animal use. Animal users will justify the use of animals in research, teaching or testing, demonstrate knowledge regarding the procedures they propose to employ, identify and assess the potential for these procedures to cause animals to experience pain, discomfort or distress, and indicate measures to be adopted to eliminate or minimize such pain, discomfort or distress. Details of procedures that will be employed now and in the future can be relegated to Standard Operating Procedures (SOPs), thus simplifying current and future Protocol Review Application.

Because each use of animals is different and specific, it is difficult to specify the level of detail required in a Protocol Review Application. **A reader of this form should be able to easily understand when and how an animal is obtained and maintained, when it enters the protocol, at what point or points it experiences various procedures, and how the animal exits the protocol. Implications for health, pain and distress must be identified and addressed wherever pertinent.** Excessive and extraneous details will distract the reader from this understanding, whereas insufficient details will result in a request for additional information.

If anyone questions the use of animals at Yukon University, the University should be able to demonstrate that all animal use is carefully evaluated and justified, is regulated and monitored, follows excellent scientific and veterinary standards, and is on par with our established excellence in research and teaching. The protocol assessment and approval process is fundamental to such a demonstration.

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| **PART I - ADMINISTRATIVE INFORMATION** |

**FOIP Notification:** The personal information requested on this form is collected and protected under the authority of the Yukon University Act and the Yukon Access to Information and Protection of Privacy (ATIPP) Act and Regulations, and will be used for the purpose of processing your Animal Care Committee (ACC) application**,** and for uses consistent with this purpose. Questions can be directed to the ACC Coordinator**,** Yukon University, 867-668-8857.

**A: INVESTIGATOR CONTACT INFORMATION**

|  |  |  |
| --- | --- | --- |
| **Principal Investigator (PI):**      | **Department:**       | **Email:**      |
| **Office Phone:**      | **Lab Phone:** | **Cell Phone:** | **Home Phone:** |
| **Co-Investigator (CI):** | **Department:** | **Email:** |

**B: EMERGENCY CONTACTS AND INSTRUCTIONS**

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| **Person(s) to contact in the event of an out-of-hours emergency:** |
| **Name:**  | **Alternate contact:**  |
| **Phone:**  | **Phone:**  |
| **Authority to euthanize in an emergency?** Yes [ ]  No [ ]  | **Authority to euthanize in an emergency?** Yes [ ]  No [ ]  |

**C: PROJECT Title (including course number, if applicable):**

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**D: APPLICATION TYPE**

[ ]  **New Application** [ ]  **Renewal of Protocol #**

[ ]  **Major Modification Requiring a Complete Application** [ ]  **Teaching Protocol**

[ ]  **Pilot:** [ ]  **New Direction in an Existing Protocol** [ ]  **Animals in Holding Facilities**

[ ]  **Not Related to an Existing Protocol**

**E. PROJECT DATES: For multi-year projects, approval can only be granted for the first year of work and for the animals required for that year. Further years can only be approved through annual protocol renewal(s) or new protocols, for up to three additional years.**

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| **Proposed Start Date** | **Proposed End Date (no longer than four years later)** |
| Click or tap to enter a date. | Click or tap to enter a date. |

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| **PART II - PROJECT PERSONNEL** |

**Scientists, teachers, technicians and students all have the responsibility to:**

* **not use animals if a replacement alternative is available and appropriate;**
* **work with the ACC and veterinary and animal care staff in a collegial and respectful manner when animal use is necessary;**
* **treat all animals with respect and dignity; and**
* **respect institutional and CCAC standards.**

**Protocol authors have responsibility for all aspects of the protocol, including:**

1. **ensuring that the ACC receives all the information required to conduct an informed review of the proposed animal use, and that it is approved before any animal use begins;**
2. **considering the Three Rs (replacement, reduction and refinement of animal use) and documenting that the proposed animal use is necessary, that the requested animal numbers are justified and that all appropriate refinements will be made (more information on the implementation of the Three Rs is available from the CCAC’s Three Rs microsite located at: http://ccac.ca/en/ThreeRs);**
3. **ensuring that any amendments to the protocol are submitted to and approved by the ACC in a timely manner;**
4. **reporting back to the ACC on the work on at least an annual basis;**
5. **ensuring that all those in their team who will handle animals are appropriately trained and competent to undertake the procedures, and that they understand what is in the approved protocol. NOTE: Individuals performing invasive procedures must be appropriately trained. If the PI is on leave for more than one month, they must inform the ACC and the facility director of the arrangements made regarding supervision of these individuals.**
6. **ensuring that the work is undertaken in practice, as approved in principle by the ACC, and meets institutional and CCAC standards.**

**A: INDIVIDUALS INVOLVED IN ANIMAL USE AND THEIR TRAINING**

**Identify the individual and their position (e.g. faculty, veterinarian, technician, student, staff etc.) involved in animal handling, and indicate their training or relevant experience. Mark with an “x” the Institutional Animal User Training Program (IAUTP) training they have received. If relevant, indicate the type of “Other Training Received”. Under Procedures, indicate the relevant number from the list below:**

1. **Meeting CCAC standards of animal husbandry and housing**
2. **Providing daily care of animals**
3. **Reporting ill/injured/dead animals to veterinarian**
4. **Performing invasive procedures**
5. **Administering analgesics**
6. **Performing euthanasia**
7. **Maintaining animal logbook**
8. **Maintaining restricted drug logbook**
9. **Performing behavioural tests**
10. **Performing field work and meeting accepted standards with respect to field work**
11. **Oversight and overall management of approved study**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of Individual** | **Position** | **Procedures** | **Evidence Skills & Training (EST)** | **Other Training Received** |
|       |       |       |       |       |
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| PART III - CANADIAN COUNCIL ON ANIMAL CARE (CCAC) REPORTING REQUIREMENTS |
| A: Is the project: Surgical: [ ]  Acute [ ]  Chronic (animal will recover from surgery) Non-surgical: [ ]  Acute [ ]  Chronic (animal will be subjected to long term and/or multiple procedures) |
| B: CCAC CATEGORY OF INVASIVENESS (see APPENDIX I for more information): |
| [ ]  A. Experiments on most invertebrates or on live isolates [ ]  B. Experiments which cause little or no discomfort or stress [ ]  C. Experiments which cause minor stress or pain of short duration[ ]  D. Experiments which cause moderate to severe distress or discomfort [ ]  E. Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals  |
| C: CCAC PURPOSE OF ANIMAL USE (PAU) (see APPENDIX II for more information): |
| [ ]  **PAU 0** Animals held in **breeding colonies** that have not been assigned to a particular protocol.[ ]  **PAU 1** Studies of a **fundamental nature** in sciences relating to essential structure or function.[ ]  **PAU 2** Studies for **medical purposes**, including veterinary medicine, that relate to human or animal diseases or disorders.[ ]  **PAU 3** Studies for **regulatory testing** of products for the protection of humans, animals, or the environment.[ ]  **PAU 4** Studies for the **development of products** or appliances for human or veterinary medicine.[ ]  **PAU 5 Education and training** of individuals in post-secondary institutions or facilities. |

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| **PART III - ANIMALS REQUESTED** |

**A: NUMBER AND TYPE OF ANIMALS REQUESTED**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Species****(Specific and common names)** | **Immuno Compromised** | **Strain** | **Weight/****Age** | **Sex** | **Source of animals** | **Total for Year 1** | **Species Status** |
|  |  |  |  |  |  |  | **Endangered** | **Threatened** | **Of Special Concern** | **Not Listed** |
| 1. |       |[ ]        |       | [ ]  Male[ ] Female |       |       |[ ] [ ] [ ] [ ]
| 2. |       |[ ]        |       | [ ]  Male[ ] Female |       |       |[ ] [ ] [ ] [ ]
| 3. |       |[ ]        |       | [ ]  Male[ ]  Female |       |       |[ ] [ ] [ ] [ ]
| 4. |       |[ ]        |       | [ ]  Male[ ]  Female |       |       |[ ] [ ] [ ] [ ]
| 5. |       |[ ]        |       | [ ]  Male[ ]  Female |       |       |[ ] [ ] [ ] [ ]
| 6. |       |[ ]        |       | [ ]  Male[ ]  Female |       |       |[ ] [ ] [ ] [ ]
|  | **B: JUSTIFICATION FOR THE NUMBER OF ANIMALS REQUESTED****Provide the statistical significance or scientific validity to justify the number of animals requested (i.e. provide the group size or range of group sizes). Reduction of animal use should be emphasized within an appropriate experimental design, while ensuring that sufficient numbers of animals will be used to fulfill requirements for statistical significance/scientific validity in the case of research projects, or for acceptance of regulatory tests.**

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|  | **C: PERMITS REQUIRED****Are federal or provincial permits required for importation, collection, and maintenance?** |
|  | **No** [ ]  |  |  | **Yes** [ ] **, Agency:**  |
| **Permit application is:** |  |  |
|  | **Approved** [ ] **Permit Number(s)**  |  | **Pending** [ ]  |  |  | **To be submitted** [ ]  |
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| **PART IV - LOCATION OF ANIMALS DURING PROCEDURES** |

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|  | **Yukon Research Centre Lab** |       |
| **Yukon University facilities (specify)** |       |
| **Other** |       |
| **Field site location (please specify):** |       |

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| **PART V – SPACE REQUIREMENTS** |

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| **YES** |  | **NO** |  |
|[ ]   |[ ]  **Will the University be required to provide additional space?** |
|[ ]   |[ ]  **Has approval for this space been sought?** |
|[ ]   |[ ]  **Has approval for this space been granted?** |
|  |  |  |  |
|[ ]   |[ ]  **Are renovations required to existing space?** |
|[ ]   |[ ]  **Has approval for these renovations been sought?** |
|[ ]   |[ ]  **Has approval for these renovations been granted?** |
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| **PART VI – JUSTIFICATION FOR ANIMAL USE** |

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| **CCAC guidelines and University policy require that animals selected should be the appropriate species and that the minimum number be used to obtain valid results. The Three Rs (replacement, reduction and refinement alternatives) should be employed. For more information, please see the CCAC Three Rs Microsite:** [**https://3rs.ccac.ca/en/about/**](https://3rs.ccac.ca/en/about/)  |

| **A. Explain the necessity of using animals in this study, and provide justification if replacement alternatives cannot be used (non-animal methods, cell-tissue culture, computer simulations, audio-visual teaching methods, the replacement of sentient animals with animals of lower sentiency, etc.).** |
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| **B. Describe the characteristics of the animal that make the species or strain appropriate for the research or teaching objectives, i.e. structural, behavioural, physiological, biochemical or other features or considerations** |
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| **PART VII – PURPOSE OF THE RESEARCH AND FUNDING STATUS** |

**Is this project? (check all applicable):**

[ ]  **Research**

[ ]  **Teaching**

[ ]  **Testing**

[ ]  **Research/Teaching**

**RESEARCH:**

**Status of Funding:**[ ]  **Awarded; Start Date:** Click or tap to enter a date. **End Date:** Click or tap to enter a date.[ ]  **Pending**

[ ]  **Not Applicable**

**Funding Agency/Source:**

**The Canadian Council on Animal Care requires that each research proposal has been evaluated and shown to have scientific merit through independent peer review before approving the project. The ACC must receive confirmation that the protocol is part of a research program or project that has been found to have scientific merit before the ACC can conduct the ethical review of the protocol. Please contact the ACC Administrator if your proposal has not been evaluated for scientific merit to arrange for independent peer review.**

**Is this project funded through a contract? Yes** [ ]  **No** [ ]

**Status of Protocol:** [ ]  **Peer-reviewed**

 **(choose 1 only)** [ ]  **Pending**

[ ]  **Non-peer reviewed**

**TEACHING (see APPENDIX III for more information):**

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| --- | --- | --- | --- |
|[ ]  **Demonstration** |[ ]  **Lab exercise** |[ ]  **Independent study** |[ ]  **Other**  |
| **Course Number/Name:** **Course Supervisor:** **Location of Procedures:** **Number of students:** **Students** [ ]  **will or** [ ]  **will not be handling the animals.** |
| **What is the estimated student/animal ratio?** **What is the estimated student/teacher ratio?**  |
| **Has the pedagogical merit of using live animals been reviewed by the pedagogical review committee?****Yes** [ ]  **No** [ ]  |

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| **PART VIII – ANIMAL PROCEDURES** |

**Cite SOP numbers/titles, where appropriate. The PI must ensure that they and their personnel have read and follow the pertinent SOPs.**

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| **A: Summary of MANIPULATIONS and management INVOLVED IN THIS PROTOCOL:** |
|  | **Check YES or NO. Wherever YES is the answer, cite the SOP or elaborate in the Detailed Description (Part E). NOTE: This list is for guidance and should not be considered inclusive of all procedures involving animals.** |
|  | **Yes**  |  | **No** |  |
|  |[ ]   |[ ]  **Restraint or handling****(SOP# and Title:**  |
|  |[ ]   |[ ]  **Individual Marking****(SOP# and Title:**  |
|  |[ ]   |[ ]  **Blood Collection****(SOP# and Title:**  |
|  |[ ]   |[ ]  **Injections****(SOP# and Title:**  |
|  |[ ]   |[ ]  **food/water restriction****(SOP# and Title:**  |
|  |[ ]   |[ ]  **ENVIRONMENTAL MODIFICATION****(SOP# and Title:**  |
|  |[ ]   |[ ]  **REINFORCEMENT****(SOP# and Title:**  |
|  |[ ]   |[ ]  **ADMINISTRATION OF CHEMICALS/DRUGS/RADIOISOTOPES** **(SOP# and Title:**  |
|  |[ ]   |[ ]  **ADMINISTRATION OF BIOLOGICALS****(SOP# and Title:**  |
|  |[ ]   |[ ]  **ANAESTHETIC****(SOP# and Title:**  |
|  |[ ]   |[ ]  **NEUROMUSCULAR BLOCKING AGENTS****(SOP# and Title:**  |
|  |[ ]   |[ ]  **MULTIPLE PROCEDURES****(SOP# and Title:**  |
|  |[ ]   |[ ]  **SPECIAL MANAGEMENT****(SOP# and Title:**  |
|  |[ ]   |[ ]  **EUTHANASIA****(SOP# and Title:**  |
|  |[ ]   |[ ]  **OTHER:** **(Relevant information not included above)** |

**B: LIST OF PROCEDURES INVOLVING ANIMALS**

**List *all* procedures, manipulations, and/or measurements that will be performed on the animals.**

| **PROCEDURES****Including injection of compounds, experimental manipulation, etc.** | **Animals involved in each procedure: species/strain and quantity** | **Distress or Pain****(B-E)\*** | **Analgesic** | **Anaesthetic** |
| --- | --- | --- | --- | --- |
|  |  |  | YES | NO | YES | NO |
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| If you need more space for animals involved, please insert new rows |       |  |[ ] [ ] [ ] [ ]

 **\* Indicate the Category for each procedure listed (refer to the Canadian Council on Animal Care’s ‘Categories of Invasiveness in Animal Experiments’, APPENDIX I).**

**C: SUMMARY OF DRUGS, CHEMICALS OR BIOLOGICALS (INCLUDING** **analgesics, anesthetics, and antibiotics)**

**Provide a description of any drugs, chemicals or biologicals to be administered (including analgesics, anesthetics, and antibiotics). Please consult APPENDIX IV (fish).**

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| **Animal** | **Agent** | **Purpose** | **Route** | **Dose** | **Frequency** | **Health Canada Exemption Required\*** |
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**\*The *Application Form for an Exemption to Use a Controlled Substance for Scientific Purposes* can be found at**

[**http://www.hc-sc.gc.ca/hc-ps/substancontrol/exemptions/applic-scien-eng.php**](http://www.hc-sc.gc.ca/hc-ps/substancontrol/exemptions/applic-scien-eng.php)**.**

**D: SAFETY INFORMATION ON DRUGS, CHEMICALS OR BIOLOGICALS (EXCLUDING analgesics, anaesthetics, and antibiotics)**

**NOTE: All injectable drugs or chemicals must be sterile and, if given parenterally, administered with sterile equipment (i.e. needles, syringes). Proper storage and disposal is essential. Drugs must not be past the expiration date. Please note that this information must be provided for tissue-based procedures that are included in approved animal welfare protocols.**

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| **Agent** | **Concentration** | **Total Volume per Administration** | **Storage (i.e. refrigeration)** | **Disposal Method** |
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**E. EXPECTED OR POTENTIAL ANIMAL HEALTH CONCERNS OR RISKS (Please consult the YukonU ACC Veterinarian prior to completing this section.)**

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| --- | --- | --- | --- | --- |
| **Agent (excluding analgesics, anesthetics, or antibiotics)** | **Expected Clinical Effects – indicate whether special care or management is required** | **Possible Side Effects – indicate whether special care or management is required** | **Pain and/or Distress experienced by the animal as a result of this administration.**  | **Measures to alleviate pain and/or distress resulting from administration of this agent.** |
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**F: DETAILED DESCRIPTION OF ALL PROCEDURES, MANIPULATIONS AND/OR MEASUREMENTS INVOLVING ANIMALS**

**The Animal Protection Act, Animal Protection Regulation, and the CCAC require that complete information be supplied about all manipulations involving animals. The primary mandate of the Animal Care Committee (ACC) is to review protocols from the perspective of the ethical and humane treatment of animals.**

1. **Provide a lay summary, outlining the objectives of the proposed project, written so that all members of the Animal Care Committee, including community and non-user faculty representatives, have sufficient information to comment on the procedures as they pertain to the care and welfare of animals.**
2. **Provide a brief rationale for each procedure, manipulation and/or measurement.**
3. **Explain in detail the procedures/experimental design.**
4. **Provide a table or flowchart detailing the timeline of the procedures, manipulations and /or measurements on individual animals or groups of animals.**
5. **Describe strategies for care to alleviate pain, distress, and discomfort. Include post-operative care, and special procedures used. Specify the criteria that will be used to assess the level of analgesia/anaesthesia required. NOTE: Specific requirements for anaesthesia, and surgical procedures are outlined in APPENDIX V (fish).**
6. **Specify the monitoring schedule during the procedure(s) and recovery.**

**For field studies, complete the Field Studies form (APPENDIX VIII).**

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| **PART IX – CLINICAL AND/OR ANIMAL USE ENDPOINT [PART X MUST BE POSTED IN THE ANIMAL ROOM(S)]** |

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| **In the course of an experiment, animals may experience expected (or unexpected) effects. Compliance with the CCAC guidelines clearly places responsibility on everyone involved in the care and use of animals to ensure that animals do not undergo *“unnecessary pain and suffering”*. This section is aimed at identifying appropriate endpoints, and providing guidance for suitable treatment of animals who have reached endpoint.****All protocols, even non-invasive ones, must identify endpoints to ensure that any animals requiring treatment are treated and that animals are not simply kept indefinitely. PI’s should refer to the *CCAC guidelines on: choosing an appropriate endpoint in experiments using animals for research, teaching and testing* (**[**https://www.ccac.ca/Documents/Standards/Guidelines/Appropriate\_endpoint.pdf**](https://www.ccac.ca/Documents/Standards/Guidelines/Appropriate_endpoint.pdf)**). The YukonU ACC Veterinarian, under the authority of the ACC and the Veterinary Professions Act, has ultimate responsibility to deal with situations of pain and distress.** |

| **A. Provide a brief summary outlining the objectives of the proposed project (you may want to copy and paste Part VIII F #1 from above).** |
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| **B. Describe any clinical conditions or abnormalities which might signal the need for an emergency euthanasia or termination of experimental procedures (see APPENDIX VI (fish) for most likely clinical conditions).** |
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| **C. An animal showing signs of sickness, pain, distress, or suffering must be assessed at least three times per 24 hour period. Indicate who will monitor the animals and record the assessments.** |
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| **D. Animals that die unexpectedly or are euthanized at humane endpoint may be submitted for post-mortem examination by the YukonU ACC Veterinarian. Describe any special instructions for sample collection at the time of euthanasia.** |
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| **PART X – SAMPLES TO BE TAKEN FROM LIVE ANIMALS (NOT post mortem tissue collections) for blood collection volume and frequency, see APPENDIX IX** |

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| --- | --- | --- | --- | --- |
| **Animal** | **Sample** | **Site & Method of Collection** | **Amount** | **Frequency** |
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| **PART XI – FATE OF ANIMALS** |

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| **Transferred to another project (provide details):** |
| **Euthanized (indicate methods of killing and disposal of carcasses or quote appropriate SOP#):** |
| **Released to the wild (indicate the length of time they are held):** |
|[ ]  **Immediately following live trapping** |
|[ ]  **Following captivity (explain the measures taken to ensure that animals can be returned to the wild successfully):**  |

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| **PART XII – HAZARDS TO STAFF** |

**Animal care approval is contingent upon review of the hazards to staff.**

**To assess these hazards, a Hazard Assessment Report must be completed, and submitted to Occupational Health & Safety (Appendix X). If you have questions regarding completion of the Hazard Assessment Report, contact Occupational Health & Safety.**

**If your research involves biohazards, contact Occupational Health & Safety for Biosafety Committee review. Please select one of the choices for the following:**

**Approval has been received or review requested from the:**

**Received Requested N/A**

[ ] [ ] [ ]  **Biosafety Committee**

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| **PART XIII – DECLARATION** |

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| **Your signature below affirms that:**1. **You acknowledge responsibility for the animals and personnel in this project.**
	1. **All animals used in this project will be cared for in accordance with the CCAC, the regulations of the Yukon and Yukon University’s Animal Care Committee.**
	2. **All students, staff and faculty are/will be trained to conduct the project in a humane and scientific manner.**
2. **The techniques, facilities and equipment to be used in this project conform to all applicable regulations and guidelines of:**
	1. **The CCAC, and**
	2. **Federal and local government regulations in force in Canada and/or the country in which the project is being conducted.**
3. **You have considered alternative procedures that do not involve the use of living animals.**
4. **You will use the minimum number of animals consistent with the objective of this project.**
5. **You have carefully selected the most appropriate species and/or model for this project.**
6. **The procedures described in this protocol must be followed unless an amendment to the protocol is submitted and approved. Substantial changes will require re-submission to the Animal Care Committee.**
7. **You will notify the Animal Care Committee in writing of any revisions to this protocol.**
8. **You will report the number of animals used in this project to the Animal Care Administrator, when requested.**
9. **You will keep copies of all approved protocols, revisions and amendments in an accessible file.**

**This protocol is valid for one year from the date of approval. Multi-year projects are subject to annual review and approval. Extensions can be granted on an annual basis, up to a maximum of four years.****Following ACC approval, a protocol number will be assigned. All animals used for this protocol should be identified (e.g., on cage cards and in the log book) with the assigned protocol number.** |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Click or tap to enter a date.

**Principal Investigator’s Signature Date**

**LIST OF APPENDICES**

**APPENDIX I:** CCAC Categories of Invasiveness in Animal Experiments

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**APPENDIX VIII:** Field Studies

**- *This appendix must be completed and attached to your Animal Welfare Approval Form, if the work involves field studies***

**APPENDIX IX:** Recommended Blood Collection Volume and Frequency (Fish)

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| **APPENDIX I: CCAC CATEGORIES OF INVASIVENESS IN ANIMAL EXPERIMENTS** |

Investigators and teachers who consider it essential to use vertebrates or invertebrates in their research, teaching or testing in the laboratory or in the field, must adhere to humane principles, and take cognizance of the CCAC Ethics of Animal Investigation and other CCAC documentation in assigning a category. Protocols must be submitted to an appropriate review committee for all studies and courses, which involve the use of vertebrates and some invertebrates in Categories B through E. Cephalopods and some other higher invertebrates have nervous systems as well developed as in some vertebrates, and may therefore warrant inclusion in Category B, C, D, or E.

The following list of categories provides possible examples of experimental procedures, which are considered representative of each category.

1. **Experiments on most invertebrates or on live isolates**

Possible examples: the use of tissue culture and tissues obtained at necropsy or from the slaughterhouse; the use of eggs, protozoa or other single-celled organisms; experiments involving containment, incision or other invasive procedures on metazoa.

1. **Experiments which cause little or no discomfort or stress**

Possible examples: domestic flocks or herds being maintained in simulated or actual commercial production management systems; the short-term and skillful restraint of animals for purposes of observation or physical examination; blood sampling; injection of material in amounts that will not cause adverse reactions by the following routes; intravenous, subcutaneous, intramuscular, intraperitoneal, or oral, but not intrathoracic or intracardiac (Category C); acute non-survival studies in which the animals are completely anesthetized and do not regain consciousness; approved methods of euthanasia following rapid unconsciousness, such as anesthetic overdose, or decapitation preceded by sedation or light anesthesia; short periods of food and/or water deprivation equivalent to periods of abstinence in nature.

1. **Experiments which cause minor stress or pain of short duration**

Possible examples: cannulation or catheterization of blood vessels or body cavities under anesthesia; minor surgical procedures under anesthesia, such as biopsies, laparoscopy; short periods of restraint beyond that for simple observation or examination, but consistent with minimal distress; short periods of food and/or water deprivation which exceed period of abstinence in nature; behavioural experiments on conscious animals that involve short-term, stressful restraint; exposure to non-lethal levels of drugs or chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, or in social responses.

NOTE: During or after Category C studies, animals must not show self-mutilation, anorexia, dehydration, hyperactivity, increased recumbency or dormancy, increased vocalization, aggressive-defensive behaviour or demonstrate social withdrawal or self-isolation.

1. **Experiments which cause moderate to severe distress or discomfort**

Possible examples: major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioural stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization; the use of Freund's complete adjuvant (see CCAC Guidelines on Acceptable Immunological Procedures).

Other examples include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; the production of radiation sickness; exposure to drugs or chemicals at levels that impair physiological systems.

NOTE: Procedures used in Category D studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioural pattern or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

1. **Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals**

This Category of Invasiveness is not necessarily confined to surgical procedures, but may include exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress; completely new biomedical experiments which have a high degree of invasiveness; behavioural studies about which the effects of the degree of distress are not known; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthestized animals; an euthanasia method not approved by the CCAC; any procedures (e.g. the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g. when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint).

Revised February 1991

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| **APPENDIX II: CCAC PURPOSE OF ANIMAL USE (PAU)** |

**PAU 0 Breeding Colony/Stock**

Animals held in breeding colonies (e.g., fish, rodents) that have not been assigned to a particular research, teaching or testing protocol.

**PAU 1** Studies of a **fundamental nature** in sciences relating to essential structure or function (e.g., biology, psychology, biochemistry, pharmacology, physiology, etc.).

**Possible examples:** studies designed to understand the cellular and/or molecular basis of inflammatory reactions or other basic physiological or biochemical reactions; studies designed to understand one or some of the various facets of the role played by a hormone or other compound produced by mammals; studies designed to better understand the behavior of various species; studies designed to better understand the population dynamics of various species.

**PAU 2** Studies for **medical purposes**, including veterinary medicine, that relate to human or animal diseases or disorders.

These are studies carried out to better understand a specific disease or disorder and to help find therapies for it.

**Possible examples:** development of a mouse model for a specific type of cancer or other disease; studies to determine which antibodies are the most likely to contribute positively to the therapy of a specific type of cancer; studies to determine which molecule within a particular class of compounds is the most likely to contribute to maintaining stable blood glucose levels in an animal model of diabetes.

**PAU 3** Studies for **regulatory testing** of products for the protection of humans, animals, or the environment.

**Possible examples:** safety testing, regulatory toxicology, vaccine efficacy trials and testing of new therapeutic compounds (if it is to generate data that is going to be used in a submission for an Investigational New Drug Application (IND) or for a New Drug Submission (NDS)); shellfish toxin.

**PAU 4** Studies for the **development of products** or appliances for human or veterinary medicine.

These are the studies carried out to investigate potential therapies (as determined following studies of PAU 2) for humans or animals, before regulatory testing (PAU 3) is carried out on the most promising therapies.

**Possible examples:** studies undertaken in animals to investigate the role and effects of a specific drug or immunotherapy candidate for cancer; studies undertaken to develop physical devices to assist heart function; studies undertaken to develop artificial organs.

**PAU 5 Education and training** of individuals in post-secondary institutions or facilities.

These are teaching or training programs where animals are used to introduce students to scientific work and teach manual skills and techniques.

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| **APPENDIX III: TEACHING PROTOCOLS** |

The use of animals for educational purposes is markedly different in its objectives than the use of animals in research or testing. Animals used for educational purposes are not being used to discover, prove or develop new ideas or techniques, but rather to demonstrate principles which are already well-known or to learn manual skills and techniques. The repetitive use of animals in this manner should be based on sound ethical justification and proven educational objectives.

There should be justification provided for the use of animals over the use of alternatives such as models, videos, computer simulations and emulations, etc. The level and type of training of the students and staff, (specialized/non-specialized) are important considerations in ascertaining the need to use animals

Teaching protocols are subject to relevant review considerations, as well as to the factors of student inexperience and "group" projects. Thus, the description should include the number of students per animal, and the student/teacher ratio. The level of experience and competence of the instructors and/or teaching assistants must be adequate to assure successful preparations and procedures. The disposition of the animals at the end of the teaching session must be clearly described.

Painful experiments or multiple invasive procedures on an individual animal, conducted solely for the instruction of students in the classroom, or for the demonstration of established scientific knowledge, cannot be justified.

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| **APPENDIX IV: CONSULATION SHEET ON THE SELECTION AND DOSAGE OF DIFFERENT DRUGS (FISH)** |

**Immersion anesthetic agents for fish**

**Anesthetic drugs dose (mg/L)1 induction time recovery time**

Tricaine methaneslfonate (TMS or MS-222)2 60-185 mg/L (fathead minnows)3 < 8 minutes < 10 minutes

 80-300 mg/L (goldfish) < 5 minutes < 10 minutes

 80-300 mg/L (rainbow trout) < 5 minutes < 10 minutes

1Dose at low end of range should be first tested on a small sample of fish as the effect of an anesthetic can vary with local water conditions, as well as the species, life stage, and size of the fish.

2TMS is acidic and must be buffered to pH 7.4 +/- 0.2 in holding tank water with sodium bicarbonate before use. The amount of sodium bicarbonate should be double the amount of MS-222 added.

3A dose of 60 mg/L TMS will anesthetize a fathead minnow in roughly 5-8 minutes. Doses in the range of 120-185 mg/L TMS will result in deep anesthesia in a matter of seconds, and have a higher risk of accidental euthanasia. It is recommended that procedures that require TMS for anesthesia are first tested with a dose in the range of 60-100 mg/L.

Metomidate hydrochloride (Aquacalm) 5 mg/L (rainbow trout) < 5 minutes < 20 minutes

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| **APPENDIX V: ANESTHESIA AND SURGICAL PROCEDURES (FISH)** |

**ANESTHESIA**

**Animals under anesthesia require constant monitoring until they are recovered. Provide details of the anesthetic protocol used.**

**Include:**

1. **Pre-surgical medication, if given (i.e. drug name, dose and route).**
2. **Induction (i.e. drug name, dose and route).**
3. **Recovery. Indicate how often the animal is observed, and when the animal will be expected to return to its home cage.**

**SURGICAL PROCEDURES**

**Survival surgery involving fish requires attention to operating table set-up, surgical techniques, and selection of materials. Careful attention must be paid to very specific housing and maintenance requirements before, during and after surgery to ensure the survival and the return to normal physiological function of the fish. Please indicate if the surgical procedures are for survival or non-survival surgery. For non-survival surgery, omit point 5.**

**Include the:**

1. **animal preparation procedures (e.g. fasting period prior to handling, procedures to minimize damage to mucus-skin barrier, procedures to minimize exposure to light and air)**
2. **details regarding pain/distress management (e.g. incision placement, surgical preparation and skin disinfection, suture materials and techniques)**
3. **type of monitoring during and following surgery**
4. **brief technical description of the surgical procedure(s). Indicate SOP# in lieu of a description. Include the expected time course for the surgery.**
5. **details regarding post operative care (e.g. monitoring of water quality, return to normal feeding and other behaviours, consultation with the YukonU ACC Veterinarian regarding antibiotic use if necessary)**

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| **APPENDIX VI:** **WELFARE INDICATORS / POSSIBLE CLINICAL CONDITIONS (FISH)** |
| **In any study where there is expected morbidity and mortality, the criteria for early euthanasia should be defined. Frequency of monitoring should allow for the timely removal of fish, before severe morbidity occurs.*****Physical Appearance***AbnormalEye conditionFin and skin conditionMucus productionColour change (usually a darkening associated with disease or bilateral blindness, however some parasites and bacterial infections can cause a paleness or loss of colour in fish)***Measurable Clinical Signs***Feed consumptionRespiratory ratePosition in water column, i.e. the individual’s position in the water (upright, upside down, tilted, etc.)***Unprovoked Behaviour***Position in the water column (e.g. crowding near the inlet or outlet pipe, shoaling, etc.)Gasping at the surfaceIrregular swimming behaviourSocial interactions – direct attack, domination of choice tank locations, schooling, social isolation (i.e. fish either socially isolated or choosing to isolate themselves from the group), not responsive to external stimulationHyperactivity / hypoactivity – movement (abnormal movements such as flashing or scraping the body), unexpected jumping or escape behaviour***Provoked Behaviour***Feeding activityThreat responseAvoidance reaction to mechanical prodAvoidance reaction to light beam |

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| **Daily Fish Health Observation Checklist** **Page #: \_\_\_\_****Laboratory: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ARF File #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Unit ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Protocol #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **Date** | **Time** | **Feeding**  | Lying at surface / not swimming off | Crowding around water inlet / Gulping at surface | Excitable / darting / tilted / erratic swimming / twirling | Bloated / eyes bulging out | Normal movement of gills / operculum | Number of fish with deformed body / lesions | Lost or damaged scales/ fins / opercula / tail | Change of any environmental enrichment | **Comments** | **Initial** |
| *dd/mm/yy* |  | Consumed within a few minutes | Reduced | Stopped |  |
|   | ***am:*** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ***pm:*** |   |   |   |   |   |   |   |   |   |   |   |   |
|   | ***am:*** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ***pm:*** |   |   |   |   |   |   |   |   |   |   |   |   |
|   | ***am:*** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ***pm:*** |   |   |   |   |   |   |   |   |   |   |   |   |
|   | ***am:*** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ***pm:*** |   |   |   |   |   |   |   |   |   |   |   |   |
|   | ***am:*** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ***pm:*** |   |   |   |   |   |   |   |   |   |   |   |   |

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| **APPENDIX VIIa: FISH HEALTH OBSERVATION CHECKLIST** |

**Humane Endpoints and Actions:**

**Conditions indicated in shaded columns should be marked as present (+) or absent (-). By convention negative signs indicate normality. If fish with any of these symptoms are found, a report should be made with the ARF technicians.**

**Identification of ‘sick fish’:**

Recognition of the initial symptoms of a ‘sick fish’ before outbreak of disease is very complicated. It is important to monitor and ensure that fish are apparently healthy in the tank. Fish health is evaluated by carefully observing the physical appearance and behavior of fish in every tank. If a tank having mortalities >10% over a 3-day period should be suspected of having disease or environmental (water quality) problems, immediately contact the principal investigator and/or ARF technicians. Common symptoms of ‘sick’ and ‘weak’ fish include but are not limited to:

1. Body shape emaciated (“skinny”) or bent; visible spots or red streaks, lesions, lumps, or white patches on the fish's body or fins.
2. Fish tail or fins are jagged or frayed at the edges or are breaking off or disappeared.
3. Scales bloating with raised scales, resulting in a fuzzy appearance.
4. Skin discoloration or change coloration.
5. Fins held close or folded rather than stretched out and spread wide open. Clamped fins can be a very vague finding but a good indication for an unhealthy fish.
6. Torn or abnormally truncated fins.
7. Fish gasping at the surface of the water.
8. Gills are puffy or swollen or flared and gill tissues are bright red or even a grayish color.
9. Damaged or missing operculum (gill covering).
10. Eye bulging or protruding.
11. Fish crashes or prolonged resting on tank bottom or floating at the surface indicates that the fish no longer has the energy to swim and doesn't have much longer to live.
12. Fish refuses or reduces the amount of regular food ration for more than 2 days indicates that the fish is in stress due to parameters such as water quality, environmental, overcrowding etc.
13. Erratic swimming (head-up, twirling, tilting etc.) indicates loss of balance to stay in water column.

 If fish with any of these symptoms are found, a report should be made with the ARF technicians.

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| **APPENDIX VIIb: WATER QUALITY AND UNIT MAINTENANCE LOG (AQUATIC SPECIES)** |

**Water Quality and Unit Maintenance Log**

**Biofilter activation ⎕ Quarantine ⎕ Experimental ⎕**

 **Page #: \_\_\_\_**

**Laboratory: \_\_\_\_ Seas ⎕ Ecol ⎕ Phys ⎕ Tox ⎕ ARF File #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Unit / Tank ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Protocol #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Water Quality**  | **Feeding**  |  **Waste removed** | **Comments** | **Initial** |
| **Date (dd/mm/yy) and Time** | **Water Temp.** (Monitron) | **pH** (calibrate daily) | **Dissolved oxygen** (Monitron) | **TAN1 (N-NH3)**  | **Nitrite2 (N-NO2)** | **Nitrate3 (N-NO3)** | **Time**  | **grams of feed and/or % of total body mass** |
| *Program64* | *Program60* | *Program51* |
|  (°C) |  | % | (mg/L) | (mg/L) |  | g / % | () |  | **Print** |
|  | *T1:* |  |  |  |  |  |  | ***am*** | g % |   |  |  |
| *T2:* | *UA =* | ***pm*** | g % |   |
|  | *T1:* |  |  |  |  |  |  | ***am*** | g % |   |  |  |
| *T2:* | *UA =* | ***pm*** | g % |   |
|  | *T1:* |  |  |  |  |  |  | ***am*** | g % |   |  |  |
| *T2:* | *UA =* | ***pm*** | g % |   |
|  | *T1:* |  |  |  |  |  |  | ***am*** | g % |   |  |  |
| *T2:* | *UA =* | ***pm*** | g % |   |
|  | *T1:* |  |  |  |  |  |  | ***am*** | g % |   |  |  |
| *T2:* | *UA =* | ***pm*** | g % |   |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

**1** Un-ionized ammonia **(UA)** in mg/L = TAN (mg/L x fraction of un-ionized ammonia (from Table 1); Un-ionized ammonia (NH3) tolerances: coldwater (50C – 170C) = 0.0125 mg/L; warm water (180C – 300C) = 0.02 mg/L; 2Nitrite (N-NO2) tolerances: coldwater (50C – 170C) = <0.2 mg/L; warm water (180C – 300C) = <0.1 mg/L; 3Nitrate (N-NO3) tolerances: 13 mg/L for all life stages of finfish other than egg stage (3 mg/L)

***Unit maintenance:* Date Initials**

1. Floor disinfected: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_
2. D.O. membrane cleaned (weekly): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_
3. D.O. probe calibrated (monthly): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_
4. Filter/activated carbon screen cleaned (for holding tank, 2x weekly): \_\_\_\_\_\_ / \_\_\_\_\_\_\_\_ \_\_\_ / \_\_\_
5. Cartridge filter cleaned: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_
6. Aragonite/carbon filter cleaned: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_
7. Virkon Aquatic solution test strip: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_
8. Virkon Aquatic replaced: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_

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| **APPENDIX VIII: FIELD STUDIES - This appendix must be completed and attached to your Animal Care Approval Form, if the work involves field studies** |

**Experimental procedures involving the capture, handling and release of wild animals are of special concern as a lack of conditioning results in a high degree of stress in captured wild animals. The necessity for capture, handling and/or administration of drugs or other compounds must be clearly established. Detailed descriptions of all pursuit, capture, handling and chemical restraint procedures, and explanations of their appropriateness, are essential. Criteria used to assess suitability for release must be clearly stated. Provision for recovery, treatment, or euthanasia of injured animals and disposal of carcasses must be specified.**

**If traps are to be used, the type of trap, its injury potential, and the monitoring frequency of the traps are important considerations. The collection of samples and affixing of devices to the animal(s) must be described (weight, method of attachment, duration) and be clearly related to the objective(s) of the study. Protocols for field studies involving population sampling by killing of animals (e.g. using methods such as shooting), must include justification for the method used. The use of such methods must be by individuals with sufficient experience and expertise to ensure that the animals are humanely killed.**

**Wildlife research may involve the use of specialized holding areas and transportation of animals. The potential for injury to personnel and the animals during these procedures should be minimized. The holding of wild animals in highly confined enclosures for extended periods should be avoided.**

**Ecological disruption may result from the performance of some types of field studies. The type and degree of disruption expected (or its potential) must be indicated (e.g., the adverse consequences to survival and reproduction experienced by the herd, colony, or individual animal due to the study procedures).**

**Provide the following information:**

1. **Method of capture/restraint, duration of captivity, and monitoring frequency**
2. **Transportation and/or housing of animals in the field**
3. **Release of captured animals (i.e. will they be released at or near the capture site, or will they be relocated to other locations and/or populations?)**
4. **Capture of non-target species**
5. **Potential injury/mortality**
6. **Special handling**
7. **Ecological impacts**
8. **Other pertinent information (i.e. address additional risk factors associated with returning animals to the wild successfully, such as preventing the transmission of disease)**

**It is the Principal Investigator’s responsibility to obtain the necessary wildlife permits. Permit numbers must be sent to the Animal Care Administrator when they have been obtained.**

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| **APPENDIX IX: RECOMMENDED BLOOD COLLECTION VOLUME AND FREQUENCY (FISH)** |

**Compared to mammals, the volume of blood per unit of body weight is considerably less in bony fish. In general, it is recommended that no more than 0.1% of the fish’s body weight (i.e. 1 mL/kg) be collected during a single survival blood collection from a non-compromised, healthy fish (*Blood Sampling of Finfish*, Canada Department of Fisheries, 2004). Species-appropriate sedation or anesthesia should be used to restrain fish for blood collection purposes, and sufficient time must be allowed for a fish to recover its hematocrit prior to subsequent blood collection. Hematocrit recovery times are temperature-dependent and highly variable between species.**

**Proposed methods for blood collection must be detailed in the protocol or appended as a standard operating procedure. Blood collection should only be undertaken by trained personnel using sterile equipment.**

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| **IX: APPENDIX X: HAZARD ASSESSMENT WORKSHEET** |

**ECODED BLOOD COLLECTION VOLUME AND FREQUENCY (FISH)**

**OCCUPATIONAL HEALTH & SAFETY**

500 University Dr.

Whitehorse, Yukon Y1A 5K4

Tel. 867-336-4945

Email: slabelle@yukonu.ca

**APPENDIX IX: RECOMMENDED BLOOD COLLECTION VOLUME AND FREQUENCY (FIS)****2.1.1 FORM - Hazard Assessment Worksheet**

|  |  |
| --- | --- |
| Department/Faculty:       | Animal Care |
| Assessment Completed By:       | Date: July 21, 2017  | Revision Date:       |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Type of Work/Activity | Hazard Type: (Physical, Chemical, Biological, Ergonomic, Environmental) | Risk (1-3)See below | Controls In Place | Controls Needed | To Be Completed By Department | Estimated Completion DateMM/DD/YY | Status |
| List all types of work done in this work area or job | **List the hazards for each work related activity** | **Exposure Frequency** | **Severity** | **Probability** | **Total Rating** | **Engineered Administrative Personal Protective Equipment** | **List if any additional controls are required for that Hazard and the date they will be in place** |  |  |  |
| Caring for animals | bites |  |  |  |  |       |       |       |       |       |
|       | scratches |  |  |  |  |       |       |       |       |       |
|       | chemical exposure |  |  |  |  |       |       |       |       |       |
|       |       |  |  |  |  |       |       |       |       |       |
|       |       |  |  |  |  |       |       |       |       |       |
|       |       |  |  |  |  |       |       |       |       |       |
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| --- | --- | --- | --- |
| **Frequency Rating:**1. Low, less than 10% of work day
2. Medium, up to 65% of work day
3. High, over 66% of work day
 | **Severity:**1. Minor, potential for minor injury
2. Moderate, potential for lost time injury
3. Severe, potential for severe injury
 | **Probability:**1. Low, unlikely to happen
2. Medium, likely to happen
3. High, very likely to happen
 | **Hazard Rating:**3-4 Low, requires monitoring5-6 Moderate, requires attention7-9 High, requires immediate attention |