

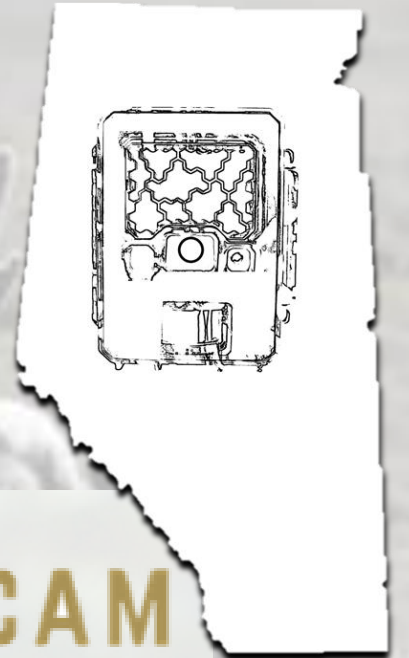
Remote Camera Survey Guidelines & Metadata Standards

Cassie (Cassandra) Stevenson (abwildlifecameras@gmail.com)

Wildlife Camera Coordinator

Dr. Erin Bayne's Lab / Alberta Biodiversity Monitoring Institute

April 25th, 2023



WILDCAM

Land Acknowledgement

In Alberta, we honour and acknowledge the traditional lands of Treaties 4, 6, 7, 8, and 10. This territory has been traditional and ancestral land of the Cree, Dene, Blackfoot, Saulteaux, Nakota Sioux, and Metis people since time immemorial, and we recognize this history.

In B.C., this research took place on the traditional, ancestral, and unceded territories of the Coast Salish Peoples – the Sk̓wx̓wú7mesh (Squamish), Stó:lō and Səl̓ílwətaʔ/Selilwitulh (Tsleil-Waututh) and xʷməθkʷəy̓əm (Musqueam) Nations – and the sngaytskstx (Sinixt) People.



Alberta Wildlife Camera Coordinator



Performing a walktest

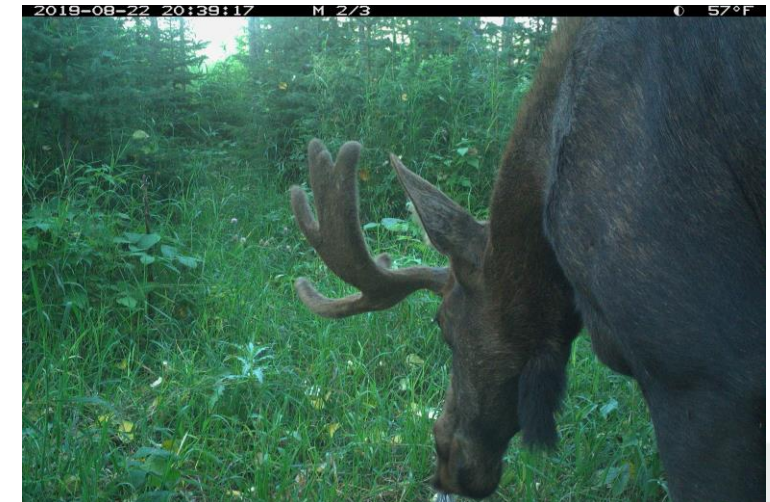
Cassie (Cassandra) Stevenson (abwildlifecameras@gmail.com)
Wildlife Camera Coordinator
Dr. Erin Bayne's Lab / Alberta Biodiversity Monitoring Institute

Outline

- 1) The Alberta RCSC and WildCAM
- 2) **Remote Camera Survey Guidelines + Metadata Standards
 - a) What they mean for you (policies)
 - b) How you can use them to align your research/monitoring with others
- 3) What's next
 - a) Study design decision support tool
 - b) RCSC Subcommittees



Alessandro Franceschini / Bayne Lab (UofA)



WildEdmonton (UofA/CoE)

Alberta Remote Camera Steering Committee (RCSC) and WildCAM Advisory Committee: experts from Alberta & BC

Vision: Enable collaboration, enable science and improve data management among remote camera users in Alberta and western Canada.



Alberta RCSC



Dr. Joanna Burgar
Wildlife Biologist, BC
Government



Melanie Percy
Protected Areas Applied
Ecologist, BC Parks



Dr. Cole Burton
Associate Professor, UBC
WildCAM Co-Chair



Dr. Anne Hubbs (RCSC Co-Chair)
Senior Wildlife Biologist, AEP



Dr. Erin Bayne
Professor, UofA
Co-Director, ABMI
Director, WildTrax



Monica Kohler
Co-Director, ABMI



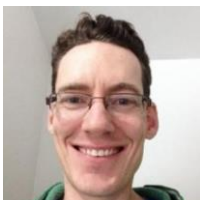
Marcus Becker
Applied Research
Specialist, ABMI



Dr. Stan Boutin
Professor, UofA
Co-Director (Emeritus),
ABMI



Dr. Kaitlyn Gaynor
Assistant Professor, UBC



Dr. Tyler Muhly
Natural Resource
Modeling Specialist,
BC Government



Dr. Jason Fisher
Adjunct Assistant
Professor, UVic



Dr. Dan Farr (Co-Chair)
Regional Director, AEP



John Paczkowski
Park Ecologist, AEP



Jesse Whittington
Wildlife Ecologist,
Parks Canada (Banff)



Eric Nielsen
Wildlife Research
Scientist, CFS



Emily Herdman
Supervisor, InnoTech
Alberta



WILDCAM

[About Us](#)

[Projects](#)

[Resources](#)

[Photo Highlights](#)

[News](#)

[Contact Us](#)

[Join](#)

[Member Login](#)



WildCAM: A Camera Trap Network for Western Canada Where You Can:

- ▶ Connect with other researchers and projects
- ▶ Share great wildlife images and news
- ▶ Get the supporting resources you need
- ▶ Compare notes on camera-trap methods
- ▶ Contribute to science-based management

www.wildcams.ca

**Camera Trap Collaborations to Improve Wildlife Management
and Conservation**



72

Projects



186

Members



6299

Cameras

“Develop a remote camera network to improve knowledge and public engagement in support of effective wildlife management and conservation in British Columbia, Alberta, Canada, and beyond”

Alberta RCSC Goals for 2021-22

Study design guidelines
& standardized protocols

Metadata standards
for Alberta

Data synthesis

Shared R scripts and
tools

Collaborate with WildCAM

Engage with the Community of
Practice (CoP)

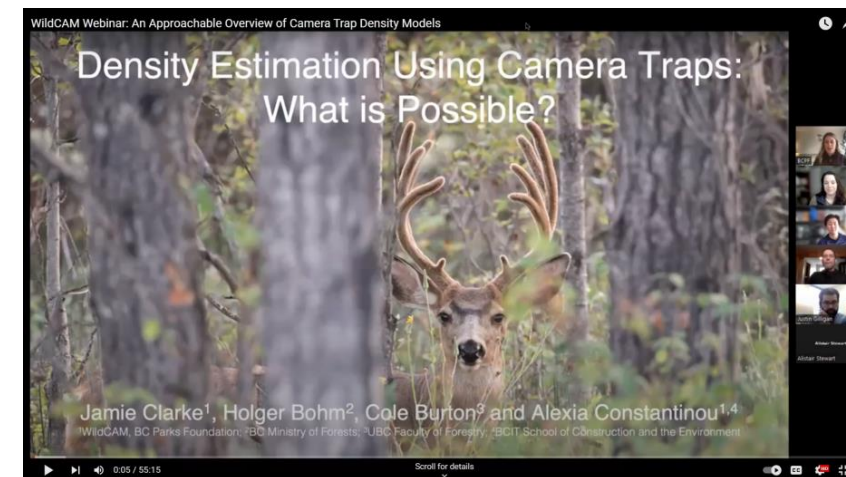
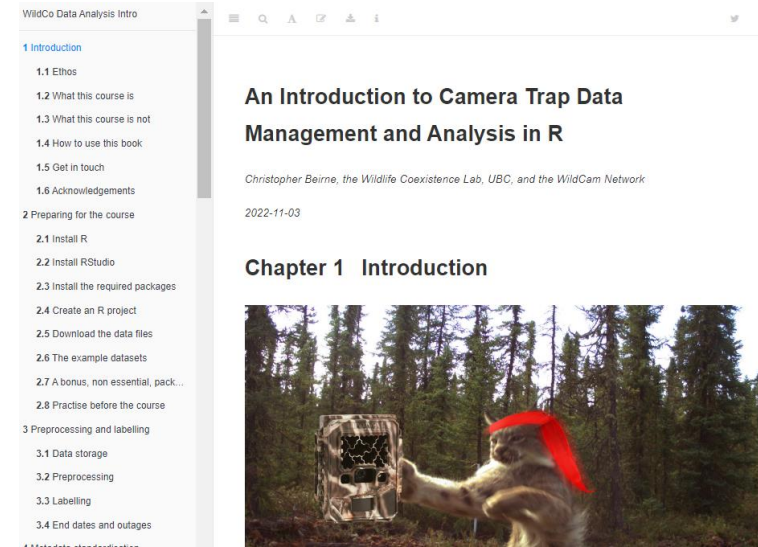




Emphasis on **collaboration**

Shared R scripts and tools

- WildCo Lab; UBC
- wildRtrax package
- data manipulation/transformation
- WildCAM “Density Handbook”



Engage with the Community of Practice (CoP)

- Quarterly webinars, newsletters, blogs (with WildCAM)



Happy spring, WildCAM members!



Image by Bryan Padron

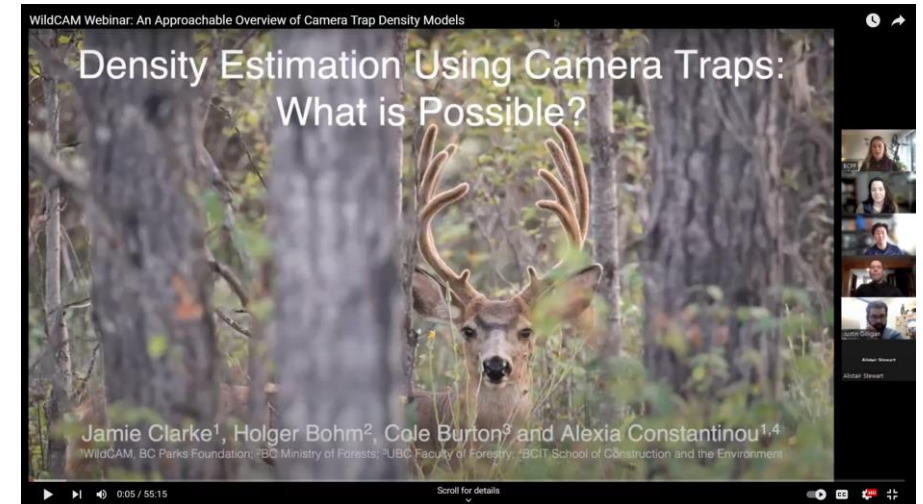
Updates

Fiscal Year In Review

WildCAM accomplished many big things during the 2022-2023 fiscal year. Here are a few highlights:

- **April 2022:** WildCAM and the Nanwakolas Guardian Council held a camera trapping workshop in Campbell River; 6 Guardians and 3 Nanwakolas staff were trained in camera trap deployment
- **June 2022:** the first WildCAM video resource – "[How to Check a Wildlife Camera Trap](#)" – was made available on our website

<https://wildcams.ca/>



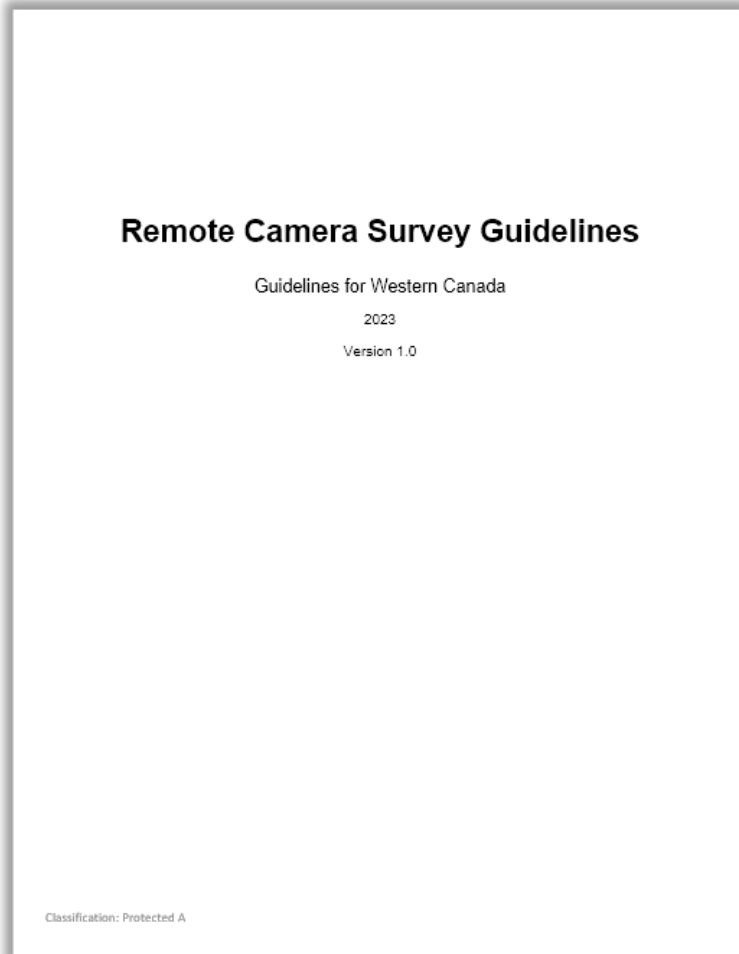
SEASONAL DISTRIBUTION, RELATIVE ABUNDANCE, AND HABITUATION OF ROOSEVELT ELK (CERVUS ELAPHUS ROOSEVELTI) IN THE COWICHAN VALLEY



Some of the species captured by our remote cameras

Written by Kate Rutherford, MSc student, St. Clair Lab, University of Alberta (clruther@ualberta.ca). The project team includes Dr. Colleen Cassidy St. Clair (University of Alberta), Dr. Darcy Visscher (King's University), and Graeme Fowler (Contractor for BC Ministry of Agriculture).

Remote Camera Survey Guidelines



Alberta Remote Camera Steering Committee (RCSC) and Wildlife Cameras for Adaptive Management (WildCAM). (2023).

Guidance on study design, deployment, and metadata

Goal → Clear, concise inventory guidelines

- Interprovincial consistency
- Facilitates comparisons
- Minimizes biases



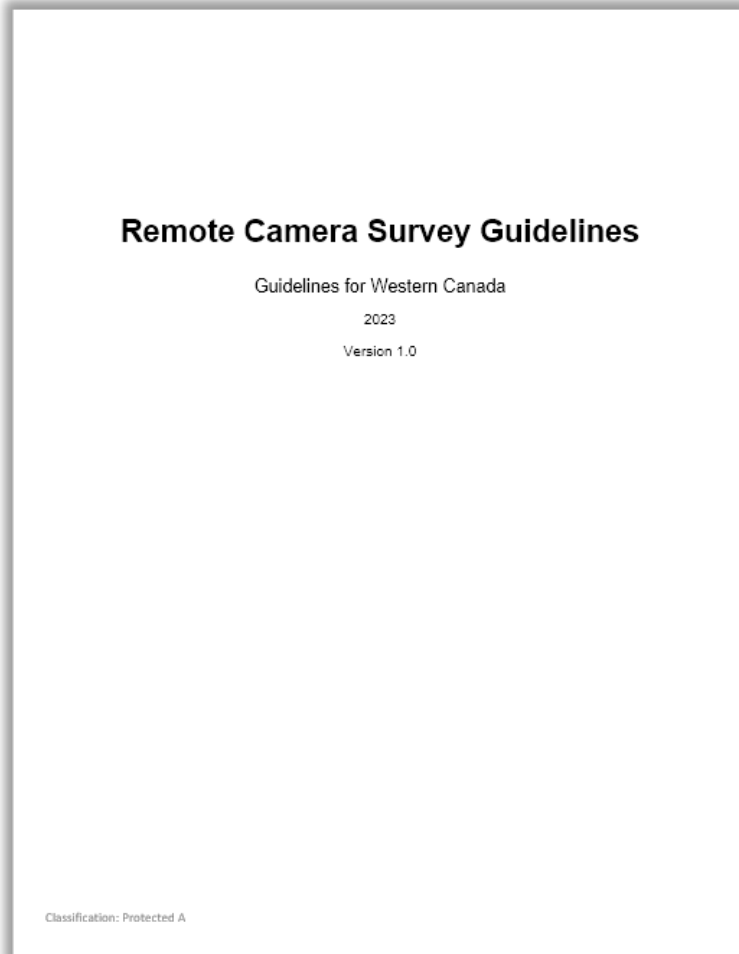
Reviewed by the Alberta and WildCAM Remote Camera Communities of Practice (COP)

Remote Camera Survey Guidelines



For those in AB, will link to:

- **AB Wildlife Camera Metadata Standards**
- **AB Provincial Sensitive Species Inventory Guidelines**
 - address listed species, species of special management concern
 - those using EIAs
- **Class Protocols**
 - when research/collection permit is required (using lure or bait)
- **AB Fisheries and Wildlife Management Information System (FWMIS)**



Alberta Remote Camera Steering Committee (RCSC) and Wildlife Cameras for Adaptive Management (WildCAM). (2023).

Remote Camera Survey Guidelines – what do they cover

Modelling approaches to meet objectives



WildEdmonton

Table A1. Summary of the assumptions and pros/cons of the different [modelling approaches](#) (adapted from Wearn & Glover-Kapfer [2017] and Clarke et al. [2022]).

Objective	Approach	Assumptions	Pros	Cons	References
Species inventory	Species inventory	<ul style="list-style-type: none"> No formal assumptions¹ 	<ul style="list-style-type: none"> Maximum flexibility for survey design (e.g., camera days per camera location or use of lure²)¹ 	<ul style="list-style-type: none"> Not reliable estimates for inference ("considered as unfinished, working drafts")¹ 	¹ Wearn & Glover-Kapfer, 2017 ² Rovero et al., 2013
Species richness	Species richness	<ul style="list-style-type: none"> Cameras are randomly placed¹ Cameras are independent¹ detection probability of different species is equal¹ ("True" species richness estimation involves attempting to correct for "imperfect detection"¹) 	<ul style="list-style-type: none"> Fundamental to ecological theory and often a key metric used in management¹ Simple to analyze, interpret and communicate¹ Models exist to estimate asymptotic species richness, including unseen species (simple versions of these models - EstimateS and the "vegan" R-packages)¹ 	<ul style="list-style-type: none"> Dependent on the scale (as captured in the species-area relationship)¹ All species have equal weight in calculations, and community evenness is disregarded¹ Insensitive to changes in abundance, community structure and community composition¹ 	³ MacKenzie et al., 2002 ⁴ MacKenzie et al., 2006 ⁶ Lambert, 1992 ⁷ McCullagh & Nelder, 1989 ⁸ Zorn, 1998
Species diversity	Species diversity	<ul style="list-style-type: none"> Cameras are randomly placed¹ Cameras are independent¹ The detection probability of different species remains the same¹ 	<ul style="list-style-type: none"> Captures evenness and richness (although some indices only reflect evenness)¹ Most indices are easy to calculate and widely implemented in software packages (e.g., EstimateS and "vegan" in R)¹ 	<ul style="list-style-type: none"> Many diversity indices exist, and it can be difficult to choose the most appropriate¹ Interpretation/communication not always straightforward¹ Insensitive to changes in community composition¹ (though this may be conditional on study design) 	⁵ Mullahy, 1986 ⁹ Royle & Nichols, 2003 ¹⁰ MacKenzie et al., 2006 ¹¹ Karanth & Nichols, 1998
Species diversity	β -diversity	<ul style="list-style-type: none"> Can be used to track changes in community composition¹ Plays a critical role in effective conservation prioritization (e.g., designing reserve networks)¹ Important for detecting changes in the fundamental processes¹ 	<ul style="list-style-type: none"> Many measures; no single best measure for all purposes¹ Comparing measures across space, time and studies can be very difficult¹ Scale-dependent (i.e., the size of the communities that are being included)¹ 		¹² Karanth, 1995 ¹³ Clarke et al., 2023 ¹⁴ Noss et al., 2003 ¹⁵ Kelly et al., 2008 ¹⁶ Moeller et al., 2018 ¹⁷ Chandler & Royle, 2012

Etc.



Remote Camera Survey Guidelines

Study design - based on objective/modelling approaches

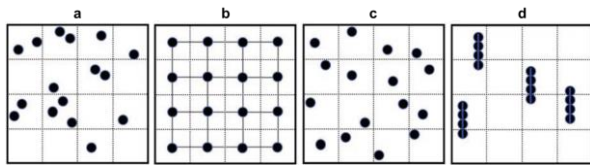


Figure 1. Examples of sampling designs: (a) simple random, (b) systematic-random, (c) stratified-random, and (d) clustered (adapted from Schweiger, 2020).

Table A2. Summary of appropriate [survey](#) design, [camera spacing](#), and [survey](#) effort (adapted from Wearn & Glover-Kapfer [2017] with additional references included) for various [modelling approaches](#). Note – these are guidelines only, using best available information. There is uncertainty associated with each of the different approaches. To address this, the table contains ‘minimum’, ‘ideal’ and ‘often’ used values, as well as qualifiers.

Approach	Camera arrangement	Camera spacing	Number of cameras	Camera days per camera location	Total number of camera days	Survey duration	References
Species inventory	Targeted ^{1,2} Random if species poorly known ³	No minimum ^{2,4} Ideally 1-2 km ^{2,4,5}	No minimum ⁴ Ideally ≥ 20 ^{1,3}	No minimum ¹ Ideally ≥ 30 ; < 30 for highly detectable ⁴	No minimum ^{1,3,4}	No maximum ^{1,4}	¹ Tobler et al., 2008 ² Rovero et al., 2013 ³ Wearn et al., 2013 ⁴ Wearn & Glover-Kapfer, 2017
Species diversity & richness	Ideally, random ^{2,4} Stratified , or Stratified-random ⁴ Clustered ^{6,7}	Ideally ≥ 1 km, but closer may be justified ^{1,8} 1-2 km is often adequate (provided each camera is treated as an independent sample) ^{1,4,9,10}	Minimum 20; Ideally ≥ 50 ; If stratified by habitat, 20-50 per stratum ⁴ 20-100 to reach species-accumulation asymptote ^{9,11,12} Commonly 30 ⁹ 25-35, scale-dependent ¹³	Ideally ≥ 30 ^{4,9}	Generally, 600-1500; ≥ 1000 ⁴	Ideally < 6 months; 3-6 months for medium-large mammals ⁴	⁵ Colyn et al., 2017 ⁶ O'Brien, 2010 ⁷ O'Connell & Bailey, 2011 ⁸ Cusack et al., 2015 ⁹ Ahumada et al., 2011 ¹⁰ Kinnaird & O'Brien, 2011 ¹¹ Wearn et al., 2016 ¹² Li et al., 2012 ¹³ Kays et al., 2020 ¹⁴ MacKenzie et al., 2002 ¹⁵ Mackenzie & Royle, 2005
Occupancy models ¹⁴	Ideally, random ⁷ Random or targeted ^{6,15-17} Clustered ^{7,18} Stratified-random ⁴	Ideally, larger than home range (minimum) or > 1 km if home range size unknown ⁴ ≥ 1 km is typical ⁴	Minimum 40 ⁴ Ideally ≥ 100 ¹⁵⁻¹⁷ > 60 ; species-dependent ² < 20 for common (occur at $> 75\%$ of sites) ¹³ ; ≤ 30 if occupancy > 0.8 ¹⁷ > 150 for rare (occur at $< 25\%$ of sites) ¹³ 30-60 sites for less common ¹⁷	≥ 30 for most ¹⁵⁻¹⁷ 80-100 if detection probability is low ¹⁷	Species-dependent; > 1200 for most ⁴ $> 1,000$ for most ^{6,15-17} $> 5,000$ for rare / hard to detect ¹⁷	Species-dependent ¹⁶ Ideally < 6 months ^{6,15-17}	

Etc.



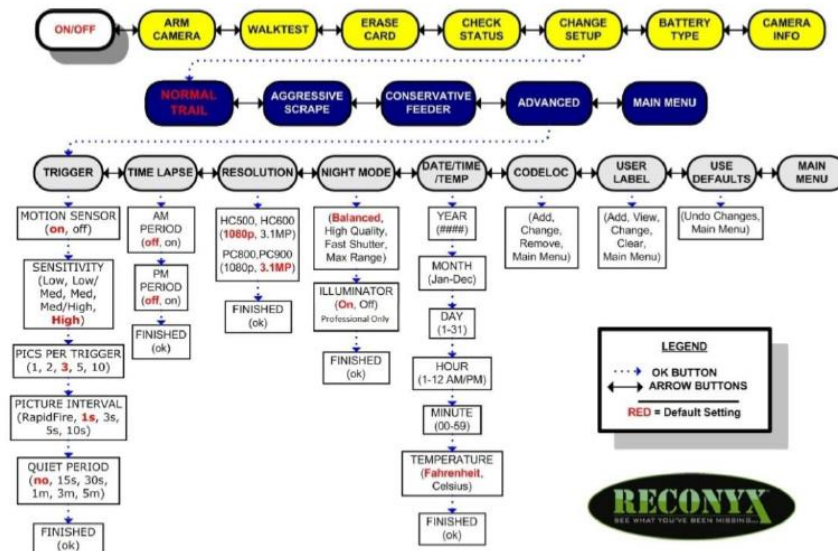
Remote Camera Survey Guidelines

→ Camera hardware options



→ SD card options

→ Camera settings



→ Field equipment

Table A4. Recommended equipment for field deployments (checklist).

Category	Equipment
Safety	<ul style="list-style-type: none"> Appropriate personal protective equipment for weather and safety (e.g., sunscreen, rain jacket, etc.) Bear spray First aid kit (ensure contents are complete) A communication device (e.g., satellite phone, radio, etc.)
Navigation	<ul style="list-style-type: none"> GPS unit (NAD83, decimal degrees) Maps Compass (set to appropriate declination; to document the camera direction)
Camera equipment	<ul style="list-style-type: none"> Reconyx HP2X unit (or camera of your choice) User manual for your camera make/model (for reference/troubleshooting) Laptop case(s) (to protect the camera lens/detectors in transit) AA lithium batteries (appropriate number make/model dependent) <ul style="list-style-type: none"> spare batteries Ziplock bags for old batteries and/or keep items dry Sharpie for labelling 1 SDHC memory card (8GB or larger) <ul style="list-style-type: none"> spare SD cards Cable lock with key (labelled with the camera ID), with adjustable straps for support as needed <ul style="list-style-type: none"> extra key for cable lock (bolt cutter useful if lock jammed) Bracket or security enclosure (e.g. lock box; optional but recommended to minimize risk of theft) Desiccant packets Lighter or de-icer (spray; for frozen locks in winter)
Camera attachment	<ul style="list-style-type: none"> Post or stake (to serve as an attachment point) Mallet (to drive in post or stake) Screws (for mounting cameras) <ul style="list-style-type: none"> Screwdrivers Phillips (crosshead) Robertson (square) Slotted (flathead)
Documentation	<ul style="list-style-type: none"> Tablet, digital camera with SD card or a phone to view photos (if required) Tablet or clipboard

Etc.



Remote Camera Survey Guidelines

→ Camera placement

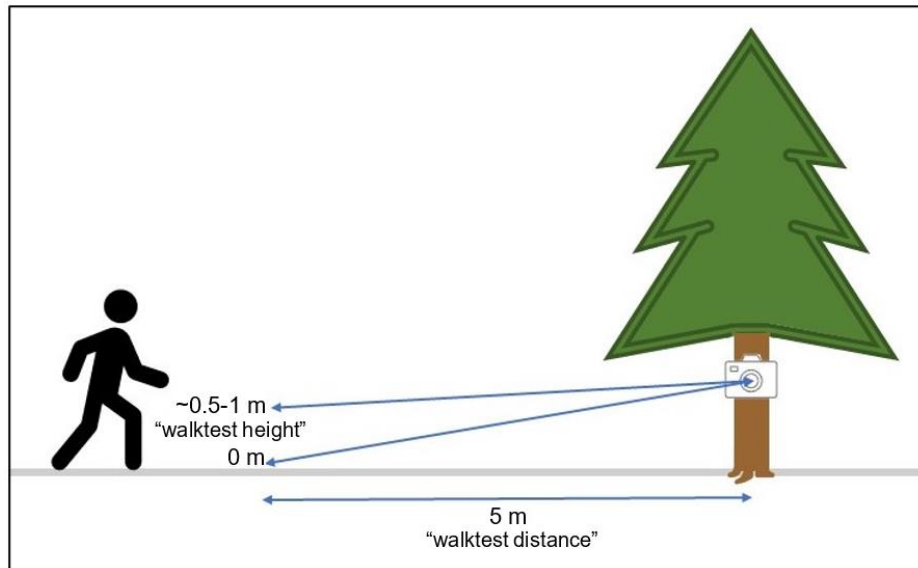


Figure 6. The walktest distance and walktest height are the horizontal and vertical distances from the camera, respectively, at which the user performs the walk test. A walktest should be performed 5 m away from the camera, at both 0 m (ground) and 0.5–1 m heights.

Table A5. Steps to deploy a remote camera.

Task	Instructions
Select camera locations	<ol style="list-style-type: none"> 1) Select the camera locations (e.g. based on study design and determined before camera set up; Appendix A - Table A2). 2) Select a Field of View (FOV) target feature (if applicable) to maximize detection probability (e.g., wildlife trail). 3) Identify a suitable attachment point in the vicinity of the target area (e.g., tree, fence post) that supports: <ul style="list-style-type: none"> • a detection zone ~3–5 m from the camera (~3–5 m from the Field of View (FOV) target feature), • a Field of View (FOV) at least 5 m wide and 10 m long (unobstructed by objects, shrubs or trees), and • the camera aimed perpendicular to the expected movement path of the target species. <p>Note: It may be necessary to bring a man-made attachment point (e.g., stake). The most suitable attachment point will depend on the camera height, angle, and direction because these choices will impact the Field of View (FOV).</p>
Set camera	<ol style="list-style-type: none"> 4) Before setting up the camera, record the camera make/model, camera serial number, and optionally the camera ID, SD card ID, key ID (for python or cable lock), attachment and the equipment that will be used to secure the camera. 5) Ensure the SD card is inserted, the batteries are fresh and turn the camera on. 6) Check (and record) the camera settings (e.g., user label, trigger mode(s), video length (seconds), trigger sensitivity, # of photos per trigger, motion image interval, quiet period, time-lapse interval (if applicable), etc.) to ensure they match the predetermined choices and that the date/time is correct. Record the deployment start date/time (in the format: "YYYY-MM-DD HH:MM:SS") 7) Attach and secure the camera to the tree/post (e.g., security box or bracket, cable lock and lock box, as needed). Security / lock boxes are recommended to avoid theft. <ul style="list-style-type: none"> • Cameras should be angled slightly downward. 8) Record the camera height. <ul style="list-style-type: none"> • In general, cameras should be ~0.5–1 m from the base of the tree to the bottom of the camera lens. 9) Record the camera direction (the cardinal direction the camera faces). <ul style="list-style-type: none"> • Cameras should ideally face north (if not, south).

Etc. ↓

Remote Camera Survey Guidelines

→ Field datasheets

Camera Deployment Field Datasheet Remote Camera Survey Guidelines - Version 1.0

Visit Metadata				
Project name:	Elevation (m):		GPS unit accuracy (m):	
Study area name:				
Sample station ID:	*Access method:		Foot / ATV / Argo / Truck / Snowmobile / Horse / Helicopter / Boat / Did Not Collect	
Camera location name:	Crew members:			
Latitude or northing camera location:	Deployment ID:			
Longitude or easting camera location:	Deployment start date/time (24hr):		YYYY - MM - DD HH : MM : SS	
UTM zone camera location:				
Equipment information		Camera settings		
Camera make/model:	*User label:			
Camera serial number:	Trigger mode(s): (circle all that apply)		Motion / Time-lapse / Video	
*Camera ID:	Video length: (seconds)			
*SD card ID:	Trigger sensitivity: (circle one)		Low / Low/Med / Med / Med/High / High / Very High / NULL	
*Key ID:	Photos per trigger: (circle one)		1 / 2 / 3 / 4 / 5 / 8 / 7 / 8 / 9 / 10	
*Camera attachment:	Tree / Post / Tree + Bungee/Strap / Tree + Screws / Post + Bungee/Strap / Post + Screws / Other**		Motion image interval: (seconds)	
*Security:	Security box / Bracket / Bracket + Screws / None		Quiet period: (seconds)	
Camera height (m): (Guidelines are 0.5-1 m; record to the nearest 0.05 m)	*Time-lapse interval: (minutes)			
*Camera direction (degrees): (Ideally north, if other explain in comments)	*Infrared illuminator: (circle one)		On / Off	
*Stake distance (m):	*Flash output: (circle one)		Low / Med / High / Off	
Test image / Walktest				
*Test image taken: (circle one; see Test Image Sheet next page)	Y / N		*Walktest distance (m): (record to the nearest 0.05 m)	
*Walktest complete: (circle one)	Y / N		*Walktest height (m): (record to the nearest 0.05 m)	
Site characteristics				
Field of View (FOV) target feature: (draw a box around one)	Game Trail / Hiking Trail / Cattle Trail / OHV Trail / Paved Road / Dirt/Gravel Road / Road Crossing / Railway / Fence / Outline / Seismic Line / Transmission Line / Pipeline / Well Site / Culvert / Building / Windrow / Clearcut / Clearing / Forest - Deciduous / Forest - Mixedwood / Forest - Conifer / Meadow / Agriculture / Pasture / Burn / Natural Funnel / Alkali / Bog / Marsh / Swamp / Wetland / Wet Margin Lake / Wet Margin Wetland / Wet Margin River/Stream / Ravine Edge / Lake / River / Stream / Water / Ocean / Snow Covered / Beaver Dam / Burrow / Nest / Den / Carcass / Natural Mineral Lick / Fruiting Tree or Shrub / Rub post / Other** / Did Not Collect			
*Camera location characteristics: (circle all that apply within a 50 m radius of the camera)				
Field of View (FOV) target feature distance (m): (record to the nearest 0.05 m)				
*Bait/lure type (circle one; if applicable)	Scent / Meat ¹ / Bait Tree / Visual / Acoustic / Other*** / None	*Deployment area photos taken: (circle one; photo order: datasheet, N, E, S, W, canopy, equipment)	Y / N	*Deployment area photo numbers: (list photo numbers)
*Camera location comments:				
*Deployment comments:				

Camera Service/Retrieval Field Datasheet Remote Camera Survey Guidelines - Version 1.0

Visit Information				
Project name:	Elevation (m):		GPS unit accuracy (m):	
Study area name:	*Access method:		Foot / ATV / Argo / Truck / Snowmobile / Horse / Helicopter / Boat / Did Not Collect	
Sample station ID:	Crew members:			
Camera location name:	Purpose of visit: (circle one)		Service / Retrieve	
Latitude or northing camera location:	Deployment ID:			
Longitude or easting camera location:	Deployment start date/time (24hr):		YYYY - MM - DD HH : MM : SS	
UTM zone camera location:				
Equipment Information				
*Camera active on arrival: (circle one)	Y / N	*New Camera ID:		
*Camera ID:		New camera make/model: (if "camera replaced" = Y)		
*Camera moved: (circle one)	Y** / N	New camera serial number: (if "camera replaced" = Y)		
*Camera damage: (circle one)	None / Physical*** / Mechanical***	*New SD card ID:		
*Camera replaced: (circle one)	Y / N	*Remaining battery (%):		
*SD card ID:		*Batteries replaced: (circle one)	Y / N	
*Card status (% full):		*Key ID:		
*SD card replaced: (circle one)	Y / N	*Security:	Security box / Bracket / Bracket + Screws / None	
Test image/Walktest		Site characteristics		
*Test image taken: (circle one; see Test Image Sheet next page)	Y / N	*Bait/lure type: (circle one; if applicable)	Scent / Meat ¹ / Bait Tree / Visual / Acoustic / Other*** / None	
*Walktest complete: (circle one)	Y / N	*Deployment area photos taken: (circle one; photo order: datasheet, N, E, S, W, canopy, equipment)	Y / N	
*Walktest distance (m): (record to the nearest 0.05 m)		*Deployment area photo numbers: (list photo numbers)		
*Walktest height (m): (record to the nearest 0.05 m)				
*Camera location comments:				
*Service/retrieval comments:				

Test Image Sheet

Remote Camera Survey Guidelines - Version 1.0

Sample station ID: _____

Camera location name: _____

Deployment ID: _____

Crew members: _____

Deployment start date/time: _____

Remote Camera Survey Guidelines

→ Data entry app - templates

The screenshot shows the 'epicollect5' web application interface. At the top, there is a navigation bar with the user's name 'Hi, Cassandra', links for 'My Projects', 'Create Project', 'Find Project', 'User Guide', and 'Logout'. The main content area features a large dark circle with the letters 'RA' inside. Below this, the title 'RCSC AND WILDCAM REMOTE CAMERA SURVEY GUIDELINES' is displayed in purple. Underneath the title is a subtitle 'Field Datasheets - RCSC & WildCAM Remote Camera Survey Guidelines'. Two icons are shown: a database icon labeled '0 ENTRIES' and a calendar icon labeled 'LAST ON: -'. At the bottom, there are two green buttons: 'DETAILS' and 'VIEW DATA'. A light gray box at the very bottom contains the text 'No description yet'.

Coming very soon!

The screenshot shows the 'ArcGIS Survey123' landing page. The top navigation bar includes 'ArcGIS Survey123', 'Overview', and 'Help', with the 'esri' logo on the right. The main visual is a dark green background with a network of white lines and a smartphone in the foreground. A green hexagonal icon with a white checkmark is positioned above the title 'ArcGIS Survey123'. Below the title, a paragraph states: 'ArcGIS Survey123 is a simple and intuitive form-centric data gathering solution. Create, share and analyze surveys in just three easy steps.' Below this text is a link 'Learn more about Survey123' and a blue 'Sign In' button.

Remote Camera Survey Guidelines

→ Data storage, processing, and analysis platforms/tools

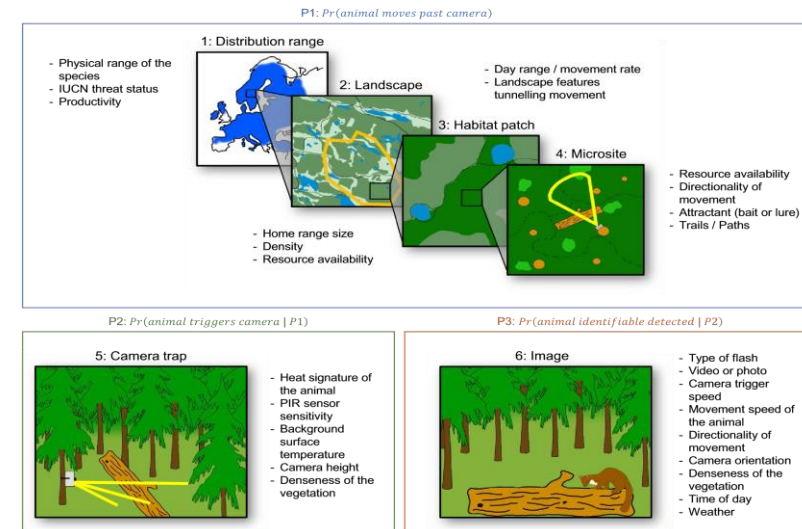
Table 1. A subset of software platforms and tools for data storage, [image processing](#), and data analysis / analytics. Refer to <https://wildcams.ca/library/camera-trap-software-and-data-management/> for a comprehensive comparison of commonly used software platforms.

Software / tool	Data storage	Image processing	Data analysis / analytics	Reference	Link
Software					
MegaDetector	No	Yes	No	Beery et al., 2019	https://github.com/microsoft/CameraTraps/blob/main/megadetector.md
Timelapse2	No	Yes	Yes	Greenberg, 2018	http://saul.cpsc.ucalgary.ca/timelapse/
WildTrax	Yes	Yes	Yes	-	https://www.wildtrax.ca/home
eMammal	Yes	Yes	Yes	McShea et al., 2015	https://emammal.si.edu/
Wildlife Insights	Yes	Yes	Yes	Ahumada et al., 2019	https://www.wildlifeinsights.org/
Reconyx MapView	No	Yes	No	Reconyx Inc., 2021	http://www.reconyx.com/software/mapview
WildCo Lab's Renamer	No	Yes	No	WildCo Lab, 2021b	https://github.com/WildCoLab/WildCo_Image_Renamer
WildCoLab's FaceBlur R-script	No	Yes	No	WildCo Lab, 2021a	https://github.com/WildCoLab/WildCo-FaceBlur
Tools					
WILDLABS Tech Tutors tutorial	Yes	Yes	Yes	The WILDLABS Partnership, 2021	https://www.wildlabs.net/event/how-do-i-get-started-megadetector
Step-by-step guide to the "best" way to explore or analyse your data bookdown	No	No	Yes	Dr. Chris Beirne; WildCo Lab, 2021	https://bookdown.org/c_w_beirne/wildCo-Data-Analysis/
Chris Beirne's Tips and Tricks for the Organization and Analysis of Camera Trap Data	No	No	Yes	Canadian Mountain Network, CMN 2020	https://www.youtube.com/watch?v=VadXgBMhiTY
Secrdesignapp	No	No	Yes	Efford & Boulanger, 2019	https://www.stats.otago.ac.nz/secrdesignapp/
Everything I know about machine learning and camera traps	No	Yes	Yes	Morris, 2022	https://agentmorris.github.io/camera-trap-ml-survey/

Remote Camera Survey Guidelines

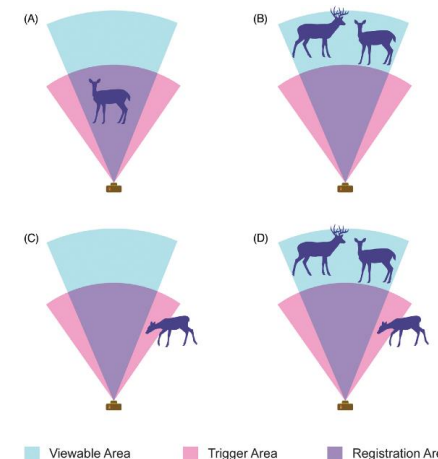
→ other tricky concepts

- Detection probability
- Detection zone **vs.** Field of View (FOV)
- Walktest
- Field of View (FOV) target feature **vs.** Camera location characteristics
- Deployment start date/time **vs.** Image set start date/time
- much more



(Hofmeester et al., 2019)

Figure 2. Spatial scales (1-6) and processes that determine the probability of detection (Hofmeester et al., 2019; abbreviated figure caption).

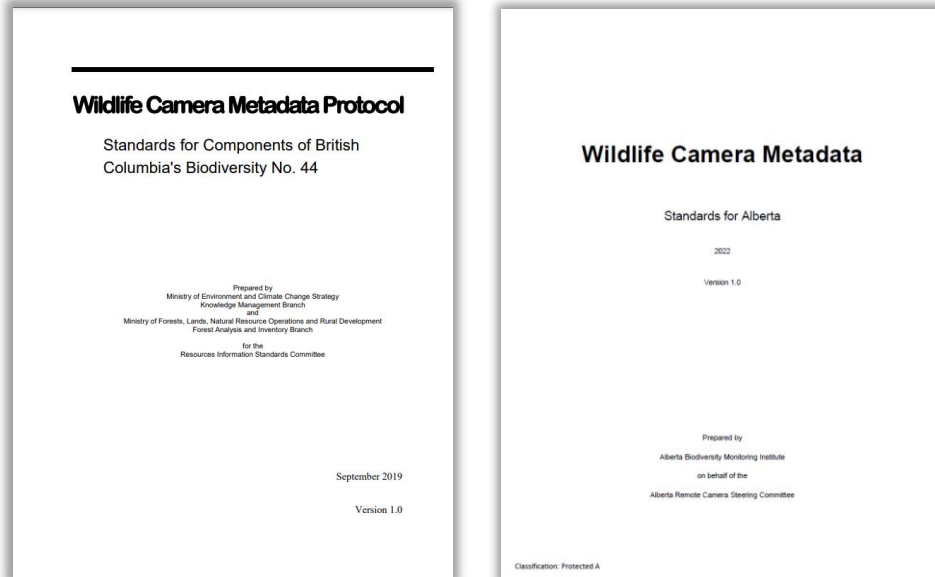


(Moeller et al., 2022)

Figure 5 (Detection zone vs. Field of View)

Wildlife Camera Metadata Standards

Starting point

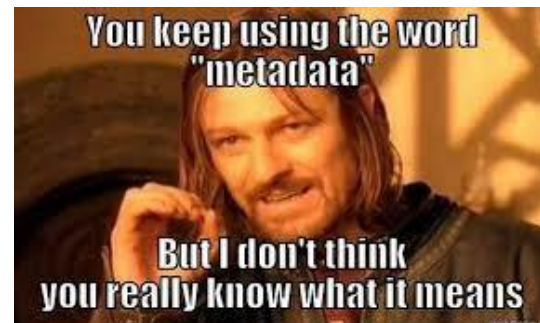
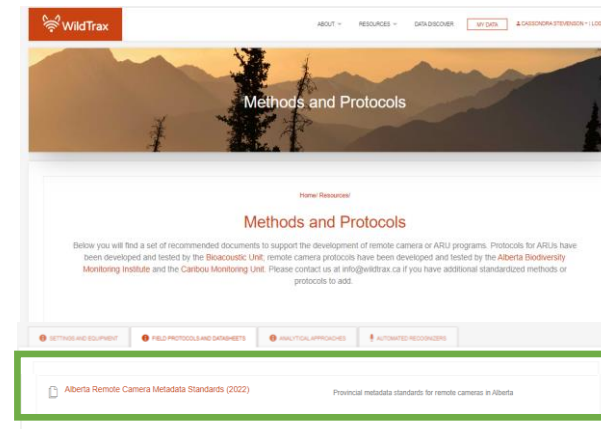
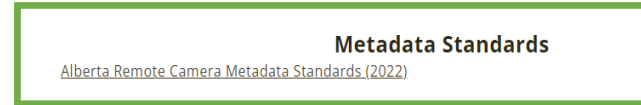


Resources Information Standards Committee (RISC; 2019)

Alberta Remote Camera Steering Committee (RCSC; 2023)



Guidance on what data should be collected and how to report it



Wildlife Camera Metadata Standards

Why?

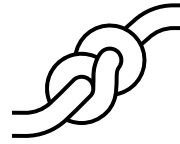
- Consistency
- Allows amalgamated datasets across larger spatial scales
- Strong foundation for design





It's all about the big data, baby

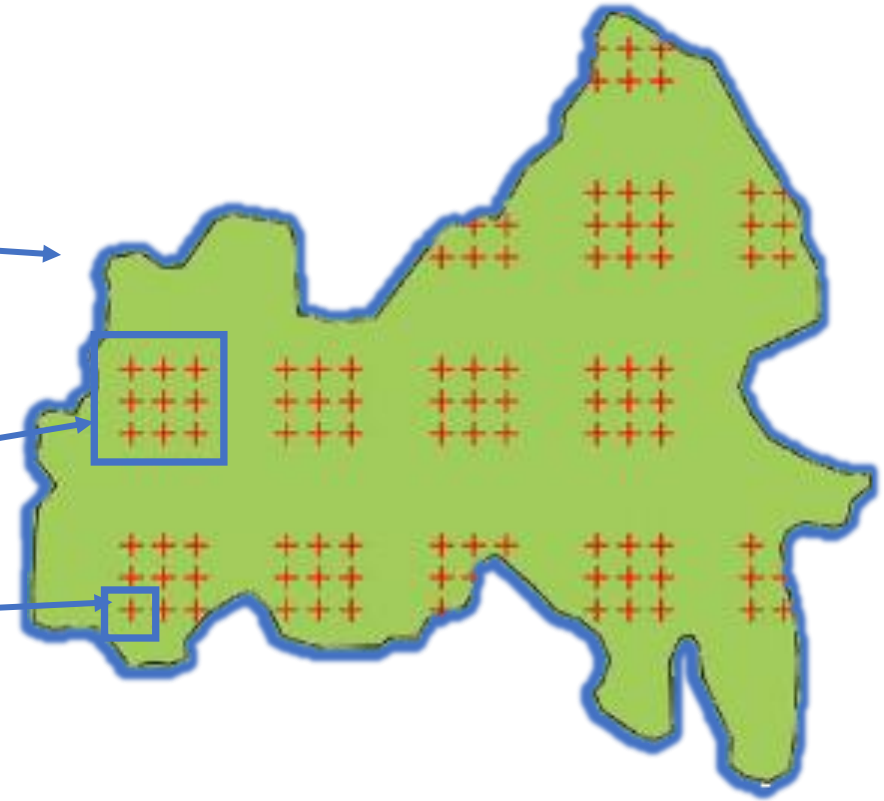


Remote Camera Survey Guidelines

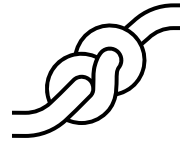


Wildlife Camera Metadata Standards

- **Project** -> objective + defined methods + defined boundary in space and time
- **Study area**
 - *may be multiple
- **Survey** -> temporal boundary  *may be multiple
- **Sample station** -> 2+ non-independent camera locations
- **Camera location** + time period 
- **Deployment** *may be multiple per camera location
- **Image/sequence**



Remote Camera Survey Guidelines



Wildlife Camera Metadata Standards

- **Project**
 - Project name
 - Project coordinator
 - Project description

*Asterisks = optional

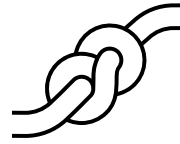
- **Study area**
 - Study area name
 - Study area description

- **Survey**
 - Survey objectives
 - Target species

- **Sample station**
 - Sample station ID

- **Camera location**
 - Camera location name
 - Latitude camera location
 - Longitude camera location
 - Northing camera location
 - Easting camera location
 - UTM zone camera location
 - Elevation (m)
 - GPS unit accuracy (m)
 - *Access method
 - Number of camera days per camera location
 - *Camera location comments
- **Deployment**
- **Image/sequence**

Remote Camera Survey Guidelines



Wildlife Camera Metadata Standards

- Project

- Study area

- Survey

- Sample station

- Camera location

- Deployment

- Image/sequence

Camera Deployment Field Datasheet

Remote Camera Survey Guidelines - Version 1.0

Visit Metadata	
Project name:	Elevation (m):
Study area name:	GPS unit accuracy (m):
Sample station ID:	*Access method: Foot / ATV / Argo / Truck / Snowmobile / Horse / Helicopter / Boat / Did Not Collect
Camera location name:	Crew members:
Latitude or northing camera location:	Deployment ID:
Longitude or easting camera location:	Deployment start date/time (24hr):
UTM zone camera location:	YYYY-MM-DD HH:MM:SS
Equipment information	
Camera make/model:	*User label:
Camera serial number:	Trigger mode(s): (circle all that apply)
*Camera ID:	Video length: (seconds)
*SD card ID:	Trigger sensitivity: (circle one)
*Key ID:	Low / Low/Med / Med / Med/High / High / Very High / NULL
*Camera attachment:	Photos per trigger: (circle one)
Tree / Post / Tree + Bungee/Strap / Tree + Screws / Post + Bungee/Strap / Post + Screws / Other**	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10
*Security:	Motion image interval: (seconds)
Security box / Bracket / Bracket + Screws / None	Quiet period: (seconds)
Camera height (m): (Guidelines are 0.5-1 m; record to the nearest 0.05 m)	*Time-lapse interval: (minutes)
*Camera direction (degrees): (Ideally north, if other explain in comments)	*Infrared illuminator: (circle one)
*Stake distance (m):	On / Off
	*Flash output: (circle one)
	Low / Med / High / Off
Test image / Walktest	
*Test image taken: (circle one; see Test Image Sheet next page)	Y / N
*Walktest complete: (circle one)	Y / N
	*Walktest distance (m): (record to the nearest 0.05 m)
	*Walktest height (m): (record to the nearest 0.05 m)
Site characteristics	
Field of View (FOV) target feature: (draw a box around one)	Game Trail / Hiking Trail / Cattle Trail / OHV Trail / Paved Road / Dirt/Gravel Road / Road Crossing / Railway / Fence / Outline / Seismic Line / Transmission Line / Pipeline / Well Site / Culvert / Building / Windrow / Clearcut / Clearing / Forest - Deciduous / Forest - Mixedwood / Forest - Conifer / Meadow / Agriculture / Pasture / Burn / Natural Funnel / Alkali / Bog / Marsh / Swamp / Wetland / Wet Margin Lake / Wet Margin Wetland / Wet Margin River/Stream / Ravine Edge / Lake / River / Stream / Water / Ocean / Snow Covered / Beaver Dam / Burrow / Nest / Den / Carcass / Natural Mineral Lick / Fruiting Tree or Shrub / Rub post / Other** / Did Not Collect
Field of View (FOV) target feature distance (m): (record to the nearest 0.05 m)	
*Bait/lure type: (circle one; if applicable)	Scent / Meat / Bait / Tree / Visual / Acoustic / Other** / None
*Deployment area photos taken: (circle one; photo order: datasheet, N, E, S, W, canopy, equipment)	Y / N
*Deployment area photo numbers: (list photo numbers)	
*Camera active on departure: (circle one)	Y / N
*Camera location comments:	
*Deployment comments:	

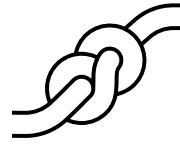
Camera Service/Retrieval Field Datasheet

Remote Camera Survey Guidelines - Version 1.0

Visit Information	
Project name:	Elevation (m):
Study area name:	GPS unit accuracy (m):
Sample station ID:	*Access method: Foot / ATV / Argo / Truck / Snowmobile / Horse / Helicopter / Boat / Did Not Collect
Camera location name:	Crew members:
Latitude or northing camera location:	Purpose of visit: (circle one)
Longitude or easting camera location:	Service / Retrieve
UTM zone camera location:	Deployment ID:
	Deployment start date/time (24hr):
	YYYY-MM-DD HH:MM:SS
Equipment Information	
*Camera active on arrival: (circle one)	Y / N
*Camera ID:	*New Camera ID:
*Camera moved: (circle one)	Y** / N
*Camera damage: (circle one)	None / Physical*** / Mechanical***
*Camera replaced: (circle one)	New camera make/model: (if "camera replaced" = Y)
*SD card ID:	New camera serial number: (if "camera replaced" = Y)
*Card status (% full):	*New SD card ID:
*# of images:	*Remaining battery (%):
*SD card replaced: (circle one)	Y / N
*Batteries replaced: (circle one)	Y / N
*Key ID:	
*Security:	Security box / Bracket / Bracket + Screws / None
Test image/Walktest	
*Test image taken: (circle one; see Test Image Sheet next page)	Y / N
*Walktest complete: (circle one)	Y / N
*Walktest distance (m): (record to the nearest 0.05 m)	
*Walktest height (m): (record to the nearest 0.05 m)	
*Deployment area photos taken: (circle one; photo order: datasheet, N, E, S, W, canopy, equipment)	Y / N
*Deployment area photo numbers: (list photo numbers)	
*Camera location comments:	
*Service/retrieval comments:	

*Asterisks = optional

Remote Camera Survey Guidelines



Wildlife Camera Metadata Standards

- Project
- Study area
- Survey
- Sample station
- Camera location
- Deployment
- **Image/sequence**



WildEdmonton

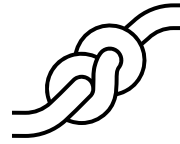
- Image/sequence date/time (YYYY-MM-DD HH:MM:SS)
- Image/sequence temperature (Celsius)
- Sequence ID
- Image ID
- Event type
- Sequence definition
- Species
- Individual count
- Age class
- Sex class
- *Behaviour
- *Animal ID
- Analyst
- *Image/sequence comments




WildEdmonton

***Asterisks = optional**

Remote Camera Survey Guidelines



Wildlife Camera Metadata Standards

 Remote Camera Survey Guidelines Metadata Standards

Wildlife Camera Metadata:
Standards for Alberta

Remote Camera Survey
Guidelines

Acknowledgments

Table of Contents

1.0 Background

2.0 Intended Audience and
How to use this document

3.0 Design Hierarchy

4.0 Objectives

5.0 Detection probability

6.0 Study Design

7.0 Camera deployment

8.0 Data management and
processing

9.0 References

10.0 Glossary

11.0 Appendix A

12.0 Appendix B

😊 Remote Camera Survey Guidelines

Guidelines for Western Canada

2023

Version 1.0

Published by the Alberta Remote Camera Steering Committee (RCSC) and Wildlife Cameras for Adaptive Management (WildCAM)

Prepared by the Alberta Remote Camera Steering Committee (RCSC).

Citation for this document:

Alberta Remote Camera Steering Committee (RCSC) and Wildlife Cameras for Adaptive Management (WildCAM). (2023). Remote Camera Survey Guidelines: Guidelines for Western Canada. Edmonton, Alberta.

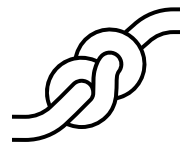
© Alberta Remote Camera Steering Committee

For more information about these guidelines or regarding the Alberta Remote Camera Steering Committee, please email Anne.Hubbs@gov.ab.ca.

For learn more about Wildlife Cameras for Adaptive Management (WildCAM), please visit the [WildCAM website](https://www.wildcams.ca) (<https://www.wildcams.ca>).

****These are
living documents**

Remote Camera Survey Guidelines



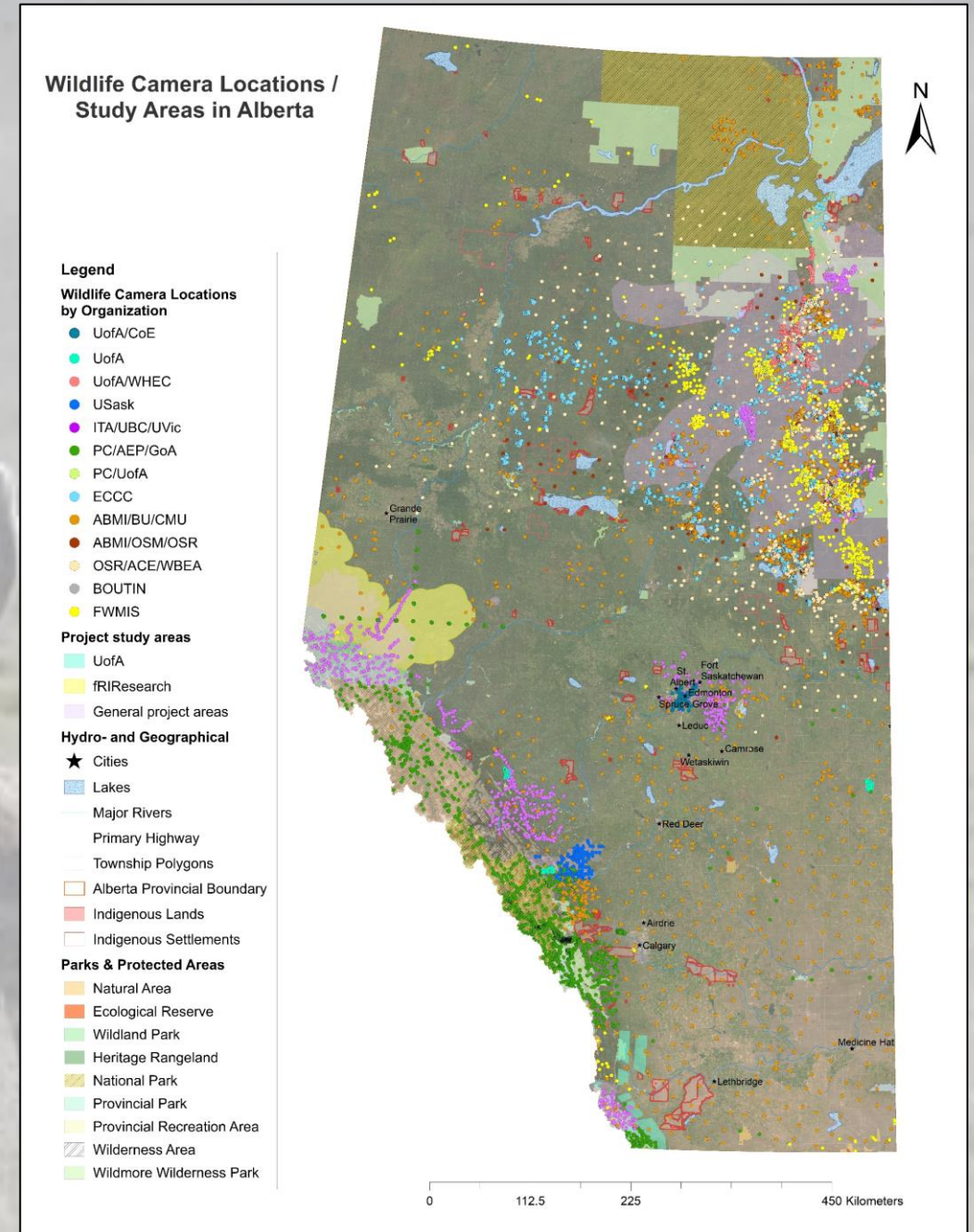
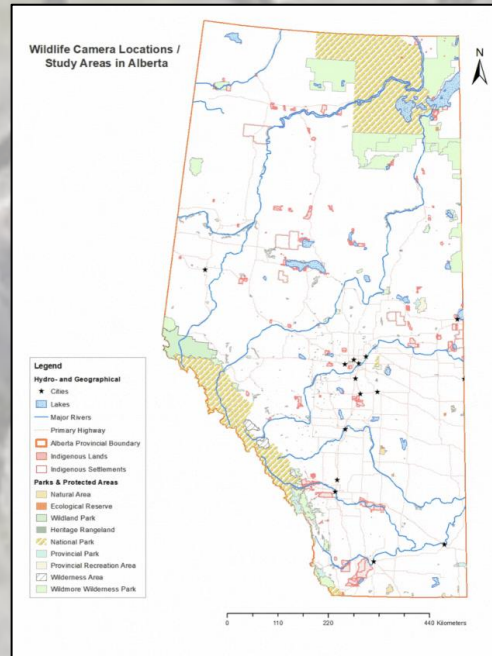
Wildlife Camera Metadata Standards

Metadata standards – Template

	A	B	C	D	E	F	G	H	I	J	K
1		Project			Study area		Survey		Sample station	Camera location	
3	Field name	Project name	Project coordinator	Project description	Study area name	Study area description	Survey objectives	Target species	Sample station ID	Camera location name	Latitude camera location
4	Field code	project_name	project_coordinator	project_description	study_area_name	study_area_description	survey_objectives	target_species	sample_station_id	camera_location_name	latitude_camera
7	Format	[text]	[text]	[text]	[text]	[text]	[text]	categorical; one-to-one	[alphanumeric]	[alphanumeric]	[numeric; 5]
8	Format/options	[text]	[text]	[text]	[text]	[text]	[text]	ACADIAN FLYCATCHER -ACFL	[alphanumeric]	[alphanumeric]	[numeric; 5]
9								ALDER FLYCATCHER -ALFL			
10								AMERICAN AVOCET -AMAV			
11								AMERICAN BISON -BISO			
12								AMERICAN BITTERN -AMBI			
13								AMERICAN BLACK DUCK -ABDU			
14								AMERICAN COOT -AMCO			
15								AMERICAN CROW -AMCR			
16								AMERICAN DIPPER -AMDI			
17								AMERICAN GOLDEN-PLOVER -AGPL			
18								AMERICAN GOLDFINCH -AMGO			
19								AMERICAN KESTREL -AMKE			
20								AMERICAN PIPIT -AMPI			
21								AMERICAN REDSTART -AMRE			
22								AMERICAN ROBIN -AMRO			
23								AMERICAN SWALLOW-TAILED KITE -ASTK			
24								AMERICAN TREE SPARROW -ATSP			
25								AMERICAN WHITE PELICAN -AWPE			
26								AMERICAN WIGEON -AMWI			
27								AMERICAN WOODCOCK -AMWO			
28								ANCIENT MURRELET -ANMU			
29								ANNA'S HUMMINGBIRD -ANHU			

Strength in numbers

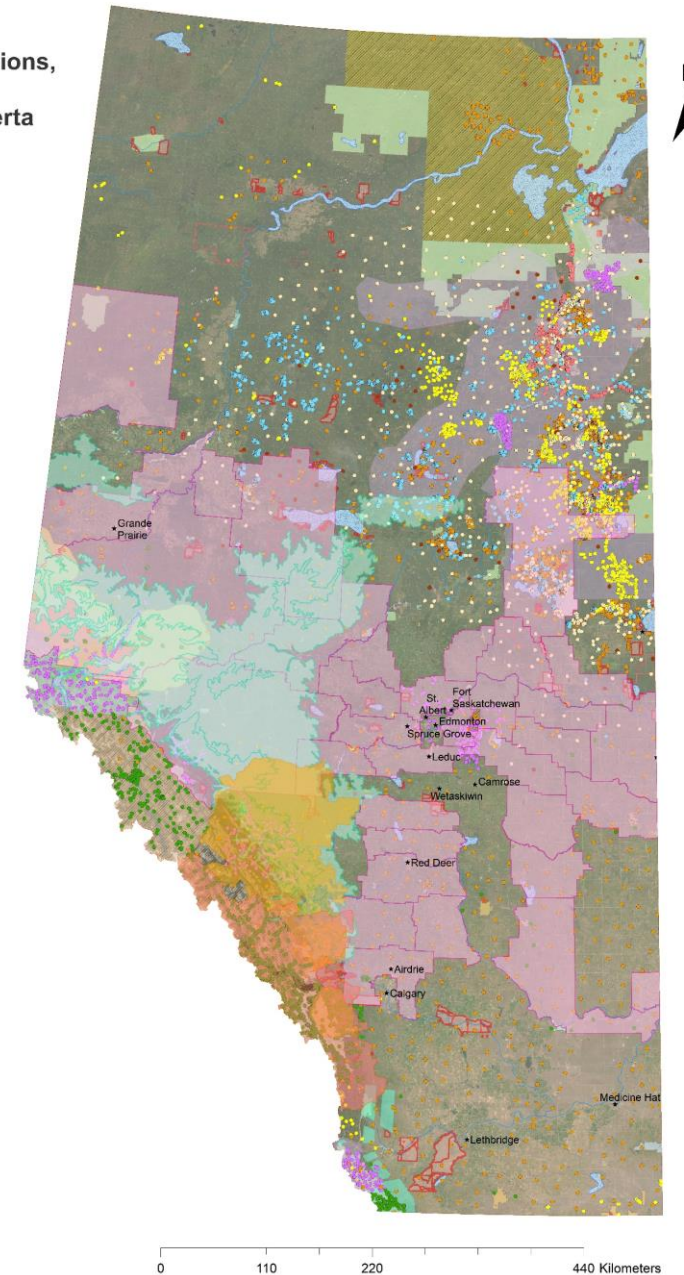
- Better/more consistent methods
- Reduced costs
- Bigger questions
- Stronger inference

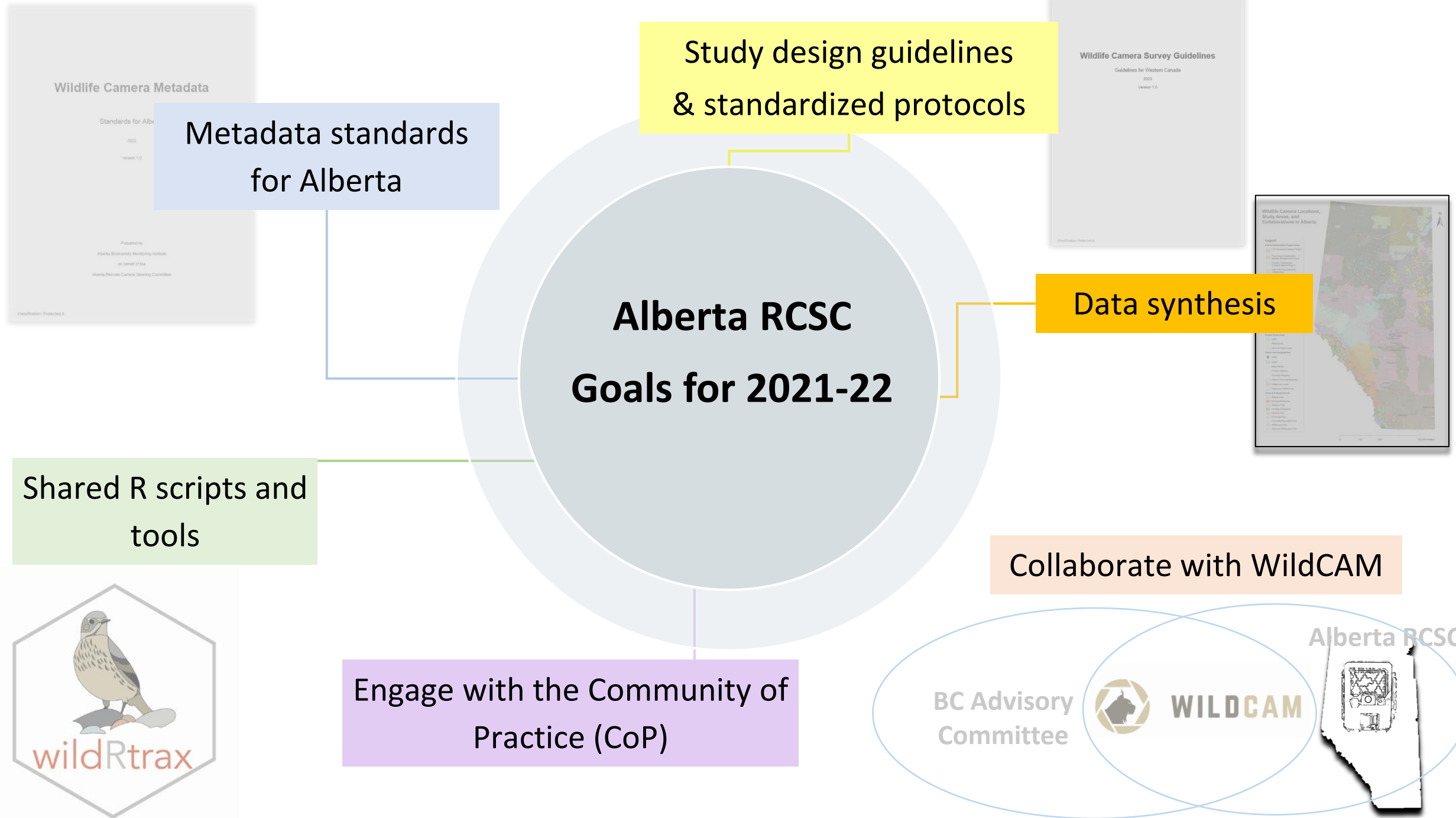


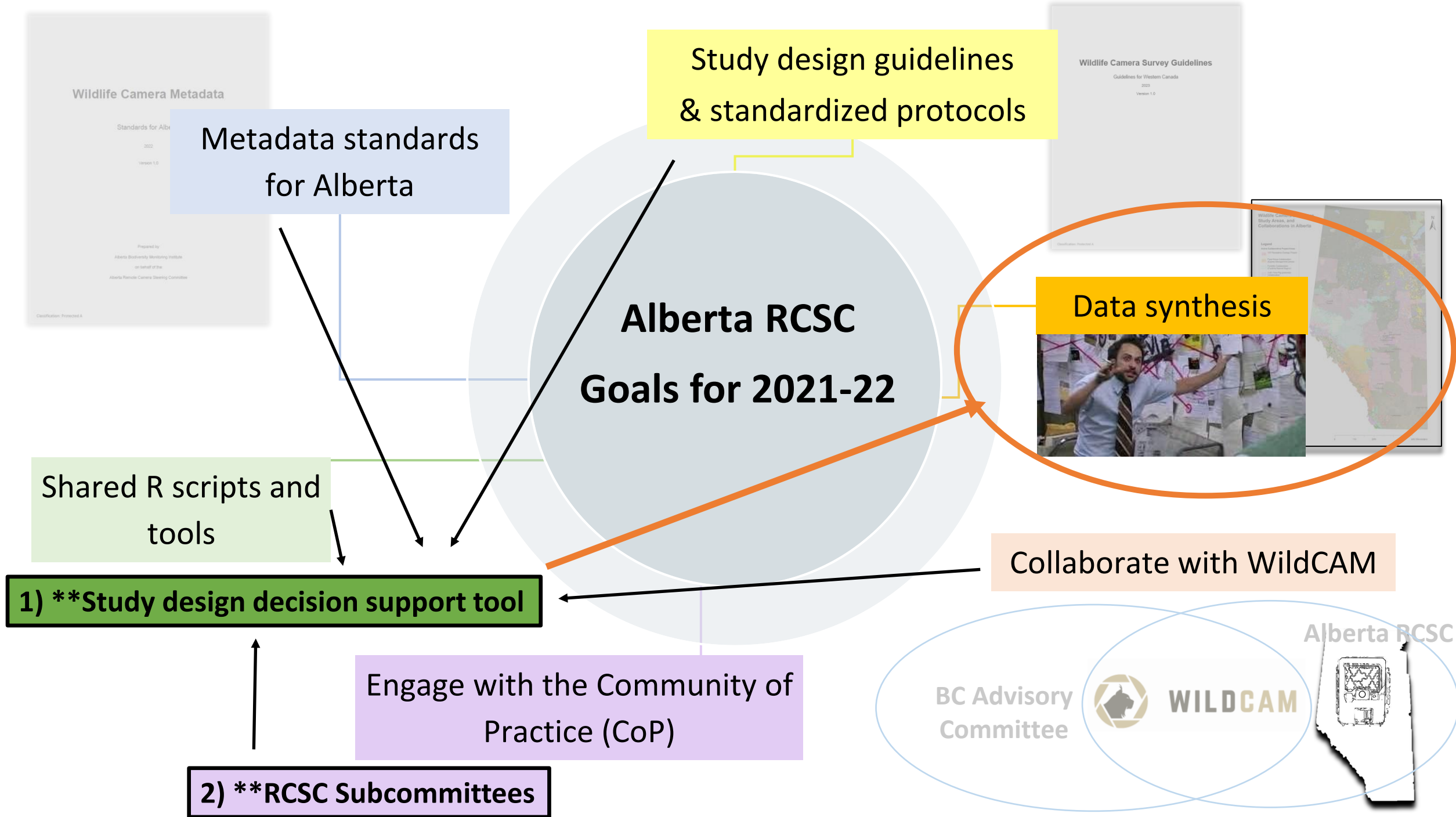
Strength in numbers

- Y2Y Recreation Ecology Project
- Feral Horse collaboration
- Foothills collaboration
- UofC Feral Pig (potential collab)
- Camera height / trail comparisons
- Camera model comparison

Wildlife Camera Locations,
Study Areas, and
Collaborations in Alberta

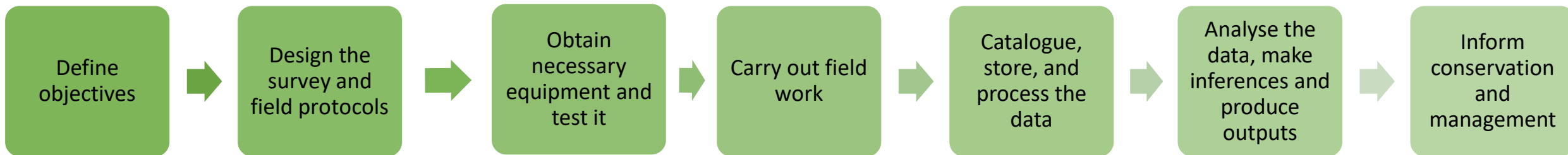






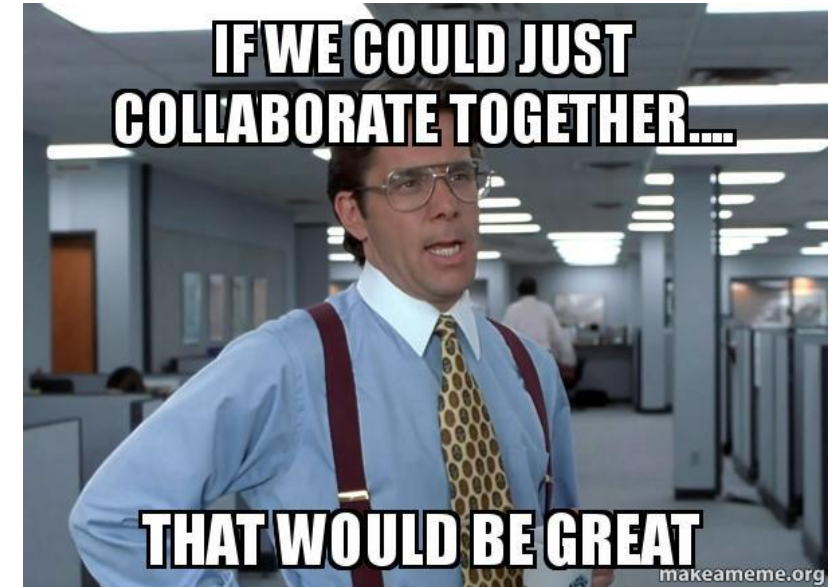
Up next - Study design decision support tool

Free, online, interactive, visual, study decision support system for remote camera projects



Up next - RCSC Subcommittees

- engage with RC communities in AB and B.C.
- develop study design decision support system
- establish a discussion forum
- advance remote cam best practices, tools and stats resources
- and more!



Next steps - let's work together

- 1) Check out the Remote Camera Survey Guidelines & Metadata Standards
- 2) Check out:
 - Field data templates for EpiCollect5 / Survey123
 - Metadata reporting template
- 3) Get in touch - Join the Alberta Remote Camera COP!
(abwildlifecameras@gmail.com)
 - Get on the map!
 - Join a RCSC subcommittee!
- 4) Join WildCAM for newsletters and resources!



WILDCAM

info@wildcams.ca



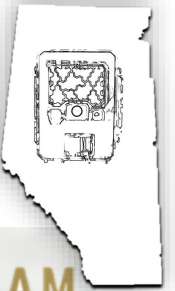
Seyer Meyhoff / Bayne Lab (UofA)

Thank you!

Questions? Email Cassie Stevenson

abwildlifecameras@gmail.com

Wildlife Camera Coordinator (Bayne Lab / ABMI)



Don't get left in the cold



Environment and Protected Areas
(AEPA) &
AEPA Office of the Chief Scientist



UNIVERSITY OF ALBERTA
FACULTY OF SCIENCE

