

Animal Welfare Challenges in Research and Education on Wildlife, Non-Model Animal Species and Biodiversity

Live Audience Q&A

DISCLAIMER Attributed responses in bold have been answered by either speakers or planning committee members and represent their own personal views, not the views of the National Academies. Unattributed responses reflect responses from workshop attendees.

Session 1

1. You may touch on this already, but would love advice on determining appropriate number of times to handle if we are looking at, say a weight curve, if there is no previous data on this species (herps)?
 - a. **Chris Parkinson:** Honestly, I always suggest minimal handling and maintain the data to determine how handling effects the taxon.
2. I was hoping someone could clarify as I missed it a bit. Was it that animals that are counted from images such as satellite are not needed for an IUCUC but if you're using helicopter surveys, drones, or collecting specimens that you need IUCUC?
 - a. **Bob Sikes:** For remote data collection, it depends on how the data are collected. The questions touches, quite correctly, on the point that some types of remote collection can indeed influence the animals. In the US, whether or not that level of influence reaches a threshold that constitutes harm or material alteration of behavior is where review by an appropriate oversight body comes into play.
 - b. **Elaine Kim:** It also depends on the context, in terms of the regulatory oversight question. What is the main objective of those surveys and activities--is it wildlife management or research? Is it being done by a collaborative organization and a researcher is collecting information opportunistically? Therefore, their involvement is secondary to the original objective of the surveys.
 - c. **Patrice Klein:** On the use of helicopters, drones, etc. - there are U.S. laws that regulate or restrict the use of flyover instruments on federal lands - especially in wilderness areas.
 - d. **Bill Bowerman:** Because of the Alaskan Aerial Hunting law, most of the use of drones for wildlife surveys is restricted.
3. Could you please recommend studies on pain threshold and stress (due to dehydration or critical body temperatures) in amphibians and small reptiles (Squamata)? Thanks!
 - a. Machin, Karen L. "Amphibian Pain and Analgesia." Journal of Zoo and Wildlife Medicine, vol. 30, no. 1, American Association of Zoo Veterinarians, 1999, pp. 2–10, <http://www.jstor.org/stable/20095815>.
 - b. Barroso FM, Carretero MA, Silva F, Sannolo M. 2016. Assessing the reliability of thermography to infer internal body temperatures of lizards. Journal of Thermal Biology 62:90-96.
 - c. Guenette SA, Giroux M-C, VACHon P. 2013. Pain perception and anaesthesia in research frogs. Exp Anim 62:87-92.

- d. Halliday WD, Blouin-Demers G. 2017. Can skin temperature be used as a proxy for body temperature in gartersnakes. *Herpetol Rev* 48:731-734.
 - e. Hopkins GR, French SS, Brodie ED. 2017. Interacting stressors and the potential for adaptation in a changing world: responses of populations and individuals. *Royal Society Open Science* 4.
 - f. Langkilde T, Shine R. 2006. How much stress do researchers inflict on their study animals? A case study using a scincid lizard, *Eulamprus heatwolei*. *Journal of Experimental Biology* 209:1035-1043.
 - g. Narayan, E. J., Cockrem, J. F., & Hero, J. -M. (2012). Effects of temperature on urinary corticosterone metabolite responses to short-term capture and handling stress in the cane toad (*Rhinella marina*). *General And Comparative Endocrinology*, 178(2), 301-305. <https://doi.org/doi:10.1016/j.ygcen.2012.06.014>
4. Can you comment on why some of the images show no PPE in use?
- a. While PPE is important in many settings, we also know that using PPE in the field can put both the animal and the investigator in harm. Therefore, some wildlife research activities may be exempt from PPE requirements (and thus the lack of PPE in the pictures).
 - i. I would be interested to learn about the cases where PPE can cause harm and what activities may be exempt.
 - b. **Patrice Klein:** If gloves are not worn, then the handlers must clean hands between each animal - and ensure no cleaner residue on hands. Also, no other chemical residues on hands (sun block, etc) which can be toxic to certain species (amphibians, eg).
 - c. It is also important to note that many of us in a lab animal setting use far more PPE than is needed, e.g. rodent facilities on vent racks and where animals are used only in a hood/BSC.
 - d. **Bob Sikes:** Regarding PPE - use of gloves or other PPE also depends on the reason for collection. If animals are destined for euthanasia and deposition in a systematics collection, as was the salamander and perhaps other animals in my slides, we seldom use PPE. That said, there are definitely steps taken either to sanitize hands and equipment between locations or animals if animals are released.
 - e. I know in the case of the Ornithological Society Guide for the Use of Wild Birds in Research, it's mentioned that wearing gloves during restraint can prevent the handler from being able to safely restrain birds without harming them, due to the loss of dexterity and feeling in the hands.
5. Based on the USDA definition of "wild state" are feral animals (i.e. cats) considered as living in their wild state?
- a. **Elaine Kim:** Feral animals are typically seen as invasive species and are characterized differently in guidance documents. This is usually in the context of an endangered, threatened native species that is being predated upon or negatively impacted by the feral species.
 - b. **Carol Clarke:** We do not view feral cats as a wild animal.
 - i. What about feral animals that would fall under an agricultural category, such as feral pigs, cattle, or birds?

- c. **Carol Clarke:** Traditional domestic animals that have become wild would need to be evaluated on a case-by-case basis. If the work done with these animals is for population management control, it is not an AWA covered activity.
 - d. Species designated as invasive should be controlled as such. Feral ctas are certainly invasive and TNR programs could be considered as inhumane under the AWA. Humane euthanasia is a better alternative once these destructive creatures are in hand
- 6. Is it the IACUC's responsibility to make ensure all appropriate permits are up to date or is this solely the PI's role, or shared?
 - a. It is ultimately the responsibility of the PI to ensure all permits are up to date. The IACUC should ask for verification and/or copies of permits.
 - b. **Bob Sikes:** This really depends on the institution, and different institutions follow different paths. Some make it clear, in writing, that the maintenance of required permits is the responsibility of the investigator and that the work cannot be conducted legally without those permits. This makes sense in many instances because if there are violations of the permits, the investigator is responsible. Other IACUCs want to see that, at least the initial permits are in place before protocol approval. There can be a catch-22 situation where permits may not be issues without an approved IACUC, and IACUC protocols are not approved without approver permits. A good resource is <https://olaw.nih.gov/education/educational-resources/webinar-2017-03-30.htm>
- 7. Are there recommendations on how to locate appropriate ad hoc consultants to supplement existing IACUC expertise?
 - a. Most taxon specific societies have animal care committees that will help local IACUCS.
 - b. A lot of the time, the PI is your best consultant. Especially with rare or rarely studied wildlife species they may be the SME.
 - c. **Laurie Baeten:** Most state wildlife agencies have veterinarians on staff that can be good resources for information.
- 8. Are the USDA standards for care of wild animals in-house taxa-specific and narrow or do they include leeway for tax-specific needs, as mentioned by an earlier speaker?
 - a. **Carol Clarke:** The AWA standards of care in Subpart F are very broad and not taxon specific.
- 9. What are the primary sources used for determining appropriate in-house keeping of wild animals?
 - a. **Elaine Kim:** This is the topic of Session 7 tomorrow, as some of the standards of care are anecdotal and peer-reviewed publications are not as widely available. Taxon Specific guidelines are a good place to start.
 - b. **Nicolette Petervary:** I think this is one of the big challenges-there often is no *Guide* information on this. But journal articles, veterinary texts, consultants and professional society guidelines can help.
 - c. **Carol Clarke:** The USDA allows institutions to consult subject matter experts and taxon specific publications regarding standards of care.
- 10. What are the primary sources used for determining appropriate in-house keeping of wild animals?
 - a. The International Wildlife Rehabilitation Council has an extensive Standards Publication. <https://theiwrc.org/resources/guidelines-for-wildlife-rehabilitation/>

11. Is there a way to update USDA standards? They seem very outdated compared to AZA standards.
 - a. **Carol Clarke:** Subpart F of the AWA regulations was written to be very general, however the USDA is in the process of re-examining this section.
12. What about field sites that have structures, permanent or temporary, that are used for short term housing or sample collection under sedation or other restraint? Do those need to be inspected by the IACUC?
 - a. **Nicolette Petervary:** PHS definitions can be useful here Animal Facility - Any and all buildings, rooms, areas, enclosures, or vehicles, including satellite facilities, used for animal confinement, transport, maintenance, breeding, or experiments inclusive of surgical manipulation. A satellite facility is any containment outside of a core facility or centrally designated or managed area in which animals are housed for more than 24 hours. Also the FAQs in my presentation can be helpful.
13. Covered activity question... Darting or trapping, sedation, attaching a radio collar, and then releasing. Is that an exempt field study or considered materially altered behavior?
 - a. Our IACUC would not consider that an exempt field study and would require an IACUC protocol for it.
14. No doubt that One Health Concept should be really spread and implemented among different communities, how can we practically convince the people of this concept?
 - a. **Bonnie Beaver:** Thanks for the question. Veterinarians have been working on spreading the One Health Concept for over 40 years, and it is at least gaining momentum. The more it is discussed, the more broadly it becomes accepted.
15. Regarding euthanasia with wildlife, what published resources are considered authoritative besides the AVMA Guidelines for Euthanasia?
 - a. AVMA guidelines is where we (National Park Service) start, taxon guidelines are the next best.
 - b. For fieldwork, the societal guidelines are also "authoritative" or at least they should be.
16. Dr. Sikes - Private urban univ IACUC presented w/ capture, injection anesthesia, & blood collection from armadillos. PI provided no references/standards. "Brick and mortar" vets have zero expertise. Where are the applicable erudite mammology standards or contemporary Murray Fowler-inspired books?
 - a. Have you contacted permitted wildlife rehabilitators in your area? They will have access to information that should be helpful.
 - i. No. We were looking to the taxon society & literature for validated guidance to efficiently conduct & conclude review. Finding no easy access to info confirming the anesthetic doses & blood collection technique were proper and safe for armadillos resulted in considerable waste in review.
 - ii. Consulting with wildlife rehabilitators and zoo veterinarians are a better resource in your situation.
 - b. For many species they aren't great widely accepted and readily accessible taxon guidelines on these topics. I'd recommend consulting with a wildlife or zoo veterinarian. We can generally bring those resources to hand more quickly.
 - c. **Bob Sikes:** I always welcome investigators and IACUCs to contact Dr. Eileen Lacey (a speaker in Session 7) or myself as co-chairs of the American Society of Mammalogists

Animal Care and Use Committee, with species-specific questions or concerns. The ACUC website is at <https://www.mammalsociety.org/committees/animal-care-and-use>. This website also provides a variety of relevant references for this question.

17. What do you tell an IACUC that is uncomfortable approving a protocol because the procedure will take place on animals at several zoos and the IACUC cannot inspect all facilities? Can we consider zoos "field sites" and exclude them from inspection?
 - a. Would they be considered client-owned animals rather than wildlife though?
 - b. Possibly, but the zoo housing them may not "own" them, making things more complicated. Sometimes the animals belong to governments too.
 - c. Seems like working with the zoo IACUCs would be a start.
18. Would weekly check-ins of non ESA raptor nest boxes for data collection be covered under USDA AWA? Would trapping and attaching a tracking device on non ESA raptors and then re-releasing be covered under USDA AWA? Who is best to contact?
 - a. One of the best places to go for these types of questions is the Ornithological Council. <https://birdnet.org/oc/>
19. My question is not specific to any one species or speaker. I am the community member on an IACUC and a wildlife rehabilitator. Do any of you utilize the wildlife rehabilitators in your state as a resource for handling, housing, and husbandry guidance? If not, why?
 - a. I find rehabilitators and zoos as great references and resources when designing captive husbandry plans for wildlife.

Session 2

1. Is there a differentiation between animals used in monitoring using the same technique to that in research, but form part of a management action? E.g., fitment of tracking devices to monitor populations. Data are primarily used to guide management but can be utilized to answer research questions.
 - a. **Bob Sikes:** In the US, the AWA regulations distinguish between management and research/education so that activities that are management focused are not covered. That said, there is often interest in publishing results from activities conducted by management agencies, and many journals are now expecting IACUC oversight (Mulcahy, ILAR Journal, Volume 58, Issue 3, 2017, Pages 371–378). Partially in recognition of this expectation, some states have or are establishing their own IACUCs.
 - i. *Clarification added after workshop: the AWA regulations exclude 'management' as covered activities, but do not specify whether this applies to wildlife. However, the USDA APHIS Inspection Guide (https://www.aphis.usda.gov/animal_welfare/downloads/Animal-Care-Inspection-Guide.pdf), guidance provided to USDA VMOs charged with inspecting and enforcing the AWA, excludes from annual reports "Wildlife management projects" (section 7.5.3).*
 - b. **Patrice Klein:** Although the AWA does not specifically include a distinction between research and management in AWA regulatory definitions, animal management activities are not necessarily exempt. This should be discussed by the IACUC at each institution.
2. Would incidental specimens, such as migratory birds killed due to glass collisions be useful to museums? Is there already a mechanism for submission for that?

- a. Yes, most museums will happily take specimens with good collection data (date and location)! Best to contact your closest museum and set up a system with them.
 - b. Also, the USFW has recognized that picking up migratory birds and giving them to a natural history collection does not violate federal regulations protecting migratory birds.
 - c. Some organizations have obtained a U.S. Fish and Wildlife Service Special Purpose Salvage Permit that allows this type of activity. A permit can be issued if there is a museum interested in accepting the specimens.
 - d. Just adding that the primary concern is that you'll fall within their state and federal salvage permits, so that is something to explicitly establish with them.
 - e. **Adam Ferguson:** Incidental specimens such as bird collisions are of value to museums but the ability to accept such specimens depends on said museum having a state (and sometimes federally) issued salvage permit with annual reporting requirements. There are also limits based on staff and space in terms of what museums can and cannot take. Regulations and museum policies make taking such specimens possible but more cumbersome than the simple act of "I found this dead animal and I'd like to give it to a museum", which is both good to ensure best practices but also limiting in terms of what can and cannot be salvaged. To my knowledge, there is no network for such connections but the best advice would be to contact your local museum and ask them directly.
 - f. **Laura Bies:** Salvaged specimens can be of use to many colleges/universities and other institutions such as museums. Many of these have the necessary permits to receive salvage permits and provide instructions on how to provide specimens to them on their website.
3. Is there any guidance or resources available for final disposition of animals that are not eligible to be released back into the field? It would be great to have other options than euthanasia such as private adoptions, donation to museums or zoos, etc.
 - a. **Bob Sikes:** Wild animals are state owned and capture/collection permits are issued to investigators. Private adoptions are not appropriate and probably not legal in most places.
 - b. **Lisa Tell:** There are options but at least in my experience it has to be built into the permits (Federal and State) and have the options pre-established. We have done that where we have arranged for hummingbirds to be donated to zoos. For specimens, they can go to museums or education programs but there are permit requirements for some species especially if they are migratory species. Some of this is addressed in the monograph about welfare conscious approaches for hummingbirds (even though it is hummingbirds the concepts can apply to other species).
 - c. Some wildlife rehabilitators have permits and facilities to provide permanent care to non-releasable native wildlife. They can also be a source of specimens when they receive animals for rehabilitation that do not survive.
 - d. Sometimes, in cases of marine mammal strandings, there are no close aquariums or rehabilitation facilities with room and euthanasia is warranted
4. How would the speakers recommend that IACUCs and the researchers working with them respond to situations where public opinion (or that of a vocal subgroup of the public) and not science, drives legislative or regulatory decisions that materially affect the scope and extent of wildlife research?

- a. **Adam Ferguson:** I think it's important for PIs, IACUCs, and regulatory agencies to emphasize that science is at the core of these regulations and that when such emotionally driven regulations are implemented we as a cohesive group push back in the legislative and public domains. The idea that doing so is considered "advocacy" is a problem scientists face as a whole, if advocates are driving regulations restricting research it is the responsibility of those conducting that research to push back on such advocacy with facts and data.
5. Research vs Management: Do management efforts have to submit for research vs management decisions? In other words, the IACUC can only review what is submitted.
 - a. At National Park Service, we consult with field staff who come to us with a research v. management question. Very often the management decision is made by the office staff (Chair, AV, Admin) based on our internal policies. Sometimes protocols will go to the IACUC and then they decide it's management.
 - b. So, if I understand, the first decision is by the management project lead to decide to seek input, rather than input being required for all projects.
6. How does the research vs. management distinction when you are using and adaptive management framework, where management is done, followed by assessment, followed by management modification, followed by assessment. Essentially, the management is the research.
7. Please comment on level of detail/specificity needed for identifying non-target species (species name and numbers) in IACUC protocol applications. Similarly, when multiple species are involved in a study (e.g., bat guano and salamanders), is the protocol associated species the salamander/both?
 - a. **Elaine Kim:** This is up to the local or applicable IACUC, and the information provided in the document should allow the IACUC to do their job as outlined in their policies and procedures.
8. Coming from an organization that has a long history of conducting wildlife field and laboratory research, I am finding the biggest challenge is for my IACUC to define the 'grey' areas, i.e. where is the line between research and management from a regulatory perspective, what constitutes 'materially altered behavior', if there is a small risk of mortality or injury due to a trapping technique (maybe mist-netting of passerine birds) does this constitute an AWA regulated activity, among other things? These decisions have been left to individual IACUCs to define for themselves (as the NPS has done with 'intent' being their biggest decision point between what is management and research).
 - a. This can lead to varying applications of the law (or other regulatory processes) and significant debate among individuals involved in the animal care and use program. In these cases, there are no clear answers, and discussions may not be satisfactorily concluded to all parties.
9. Thank you Dr. Tell! Out of curiosity, what do you use in your feeders, and how often do you clean and refill them?
 - a. **Lisa Tell:** We are very commonly working at locations where feeders are already being used by individuals managing the land. Most commonly, people use a 1 part pure cane granulated sugar to 4 parts water that is designated to be safe to be consumed by humans. In regards to cleaning and refilling feeders, it is situational depending on the

time of year, sun exposure, insect access etc. Our recommendation is to have a standard of practice in which the sugar water would be of quality for any animal or human to safely consume. This very commonly requires at least once a day changing of the sugar water or more often. As a side note, native plants are a great resource for birds as an alternative to feeders.

10. How do you prioritize what you would put in the newer version of the *Guide* for Wildlife studies (research) and do you include wildlife management components in this?
 - a. **NASEM:** We are in the first phase of our 5-phase process of revising the *Guide* and are in the information gathering stage that will inform the process. While content of any new version of the *Guide* or some other product is outside the purview of this workshop, it is our hope that insights gained from the workshop will help shape that product by the Standing Committee and subsequent steps.
11. Dr. Heaney - was this a Grant? How were you able to do this study?
 - a. **Lawrence Heaney:** This project began in 1981 and is still active. Some funding came from NSF, but the majority came from private foundations and donations to the museum to support the project.
12. For the scenarios described by Dr. Bateman re: site on fire/cattle guard installment, preventing daily checks on live animal traps. If these studies were funded by NSF, presuming that these events would be reported as protocol noncompliance, and quite possibly, adverse animal events - yes?
 - a. On the one hand: wildfires, drought, unexpected freezes - animals are exposed to a lot - naturally... On the other hand: if they weren't in a trap, they would have avoided the fire/drought/etc... Back to the first hand: they may die anyway. So are these really noncompliance or adverse events?
 - b. I would interpret it, as, if animals were left in the trap longer than was described in the approved protocol then that is a non-compliance event and should be reported.
13. For Field Safety how do you check/enforce vaccines that students need for the field?
 - a. **Chris Parkinson:** Our medical surveillance program and our travel client handles.
14. Really like the idea of the field fashion show. Thanks for sharing, Dr. Bateman. Are there websites that could be used as a reference for this type of event?
 - a. **Heather Bateman:** We don't have a web page for the fashion show. But have gathered ideas from the Wildlife Society community. One person has a blog and she goes by FancyScientist on Twitter and such. Here is her webpage:
<https://stephanieschuttler.com/>
15. What is your process for ensuring folks are trained for procedures in the field? Have had requests from IACUC during review to provide video of procedures to verify people are trained, difficult to do when the protocol not yet approved and procedures won't be captured until in the field.
 - a. At Boston University we asked the PI to provide details for how they will train staff and then a record of each training session per person. It was our assumption that the PI or one of their collaborators was in fact the expert on the procedure and was the best person to provide training. We had many protocols worldwide and if the PI was unable to find an appropriate person to provide training themselves we would assist them.

16. To Dr. Bateman - how do you mark snakes? I am most familiar with fish tagging and marine mammal tagging and I don't think a spaghetti tag or flipper tag works in this case. Are markings on snakes different enough for photo id?

- a. **Chris Parkinson:** Ventral scale clipping and PIT tags are the easiest marking methods for snakes.
- b. **Heather Bateman:** We mostly mark lizards, but have marked snakes with light cautery wand - mark one ventral scale. But we rarely recapture snakes, so we often avoid marking them or even trying to get a total length measure (something that is pretty stressful for snakes). So the answer will be specific to the research question. In other studies, we worked with vet to insert transmitters in snakes because the research focused on breeding and overwinter habitat use.

Session 3

- 1. What is the best way to disinfect small mammal live traps between locations that won't impact recapture rates from smell?
 - a. Good old (fragrance-free) soap and water?
 - i. But will that deal with viruses?
 - b. Virkon-S. Soap and water followed by diluted bleach (1:30 or 1:10) and then rinsed with water. Virkon S should be rinsed as well.
 - c. Probably not non-enveloped viruses or spores, but detergent effect of soap, mechanical scrubbing and copious water use could dilute to non-infectious levels. I'm speculating and only a partly qualified "expert".
 - d. Bleach is a disinfectant, but not a cleaner, inactivated by organic contaminants (e.g., feces, soil). It requires 10+ minute contact time, but then is corrosive to metal. The soap, water, bleach, water sequence may make sense. Your safety office experts could advise.
 - e. Correct, our dept uses Virkon for many decontamination needs. There also accelerated peroxide compounds but I don't have as much experience with them.
- 2. Advice on how to coordinate multiple IACUCs in multi-agency/university projects? Very common now that most state and federal agencies/regions have their own IACUC. Training, field safety issues, and use of controlled/prescription drugs can get confusing.
 - a. **Chris Parkinson:** It is all about communication and have SOP's in place that articulates how processes occur.
 - b. Very good question - my response is by no means complete. We identify which institution that personnel originate from - and, consider which institution is asking for the wildlife permits to be secured - to determine who is responsible for oversight/study activities. Venn diagram scenario to be sure.
 - c. **Patrice Klein:** Recommend all collaborating IACUCs do a "concurrence review/approval" to ensure accord and consistency. The AV's could schedule time for discussion amongst themselves or with the PI to address any specific concerns or questions.
 - d. Agree with Dr. Klein. We also consider establishing an MOU in these circumstances.
 - e. In the case where multiple IACUCs can be involved our general policy is to defer to one IACUC and hold a copy of their permit with contact information on file. As long as the IACUC is competent, it shouldn't matter who does the review.

3. Q to Dr Vance: How many countries are co-operating and funding these efforts? Is there any list published? How small animal welfare societies can participate and co-operate?
4. Can you suggest sources/examples for wildlife-specific AUP submission forms?
 - a. There is a great example on the American Society of Mammalogist IACUC website.
5. A question for the last speaker - how would you distinguish between the responsibilities of an IACUC, an institution's biosafety committee and/or their environmental health and safety group with regards to evaluating a wildlife-related activities?
6. While standardizing practices are not without issues, what is the thought about standardized IACUC protocols to reduce not only differences in protocols between institutions, but to perhaps improve potentially subpar practices/forms? This practice may also reduce workloads.
 - a. For exactly this reason, Bill Greer (University of Michigan) is spearheading a new Universal Protocol Template through the Federal Demonstration Partnership!
 - b. There is a group, FDP CUSP, working towards the idea of a standardized IACUC protocol to capture all areas of research. Nascent stage.
<https://thefdp.org/default/committees/research-compliance/iacuc/>
7. Most countries don't even have tech tools or awareness of biosecurity. Example amphibian maps that were presented by Dr V. Areas in LATAM have programs to protect wildlife. We have to co-ordinate, ask for funding at broader global scale to avoid more extinction events. Any links? Suggestions?
 - a. Are you thinking something similar to this?
<https://www.ifaw.org/projects/conservation-leadership-in-the-caribbean>
8. With the various wildlife-centric research proposal forms, program review forms, etc out there - or if your IACUC created its own - how do you know that the questions you're asking are the right questions. Or that we're asking enough questions to truly suss out what needs sussing?
 - a. Providing a template or a set of standards for fish-/wildlife-centric forms/facilities, etc would help ensure that the IACUC has considered everything that makes fish/wildlife research unique. I love a good checklist!
 - b. **Laurie Baeten:** I would suggest that considering those questions during their SARs. Make changes as needed.
 - c. I've used questions from the Model Wildlife Protocol from the Ornithological Council and added to that: <https://birdnet.org/info-for-ornithologists/animal-welfare-resources/model-wildlife-protocol/>

Session 4

1. Great discussion yesterday about challenges to research. Please mention approaches to follow-up for unanticipated problems and dealing with adverse events. What are the reporting expectations?
 - a. **Elaine Kim:** If you are asking about compliance reporting to external agencies, OLAW has a helpful page on reporting noncompliance
<https://olaw.nih.gov/guidance/reporting-noncompliance.htm>. If asking to discuss what an IACUC should do in terms of a debrief or post-mortem/discussion, it depends and varies with each program and committee.
2. There was mention yesterday about the ethical implications of removing animals from the wild and returning them to their capture location or introducing captive-reared animals. These

actions could present several ethical and bioethical dilemmas that cause more harm than benefit. Thoughts?

- a. **Mark Drew:** Part of the answer lies in how long the animals are in captivity. Very short term captivity may allow return, but the risks of behavior alterations and disease introduction may be problematic for longer term captivity. I agree about the ethical issues - individual vs population. No easy answer but one that researchers and IACUC need to be aware of.
- b. **Bob Sikes:** Release of animals that have been in captivity must be approached carefully. Concerns are many and must include permits/regulations regarding release. It will likely differ with each situation, species, and location. The ASM mammal guidelines provide some specifics relevant to mammals on page 681, but most of these concerns will extend to other species as well (http://www.mammalogy.org/uploads/committee_files/CurrentGuidelines.pdf). The details will change with species and situations and must take into account potential for introduction of pathogens into the native populations.
3. To all speakers of this session. How can regulatory burden be reduced without lowering animal welfare? Can ILAR help?
 - a. **Elaine Kim:** This question/comment brings to mind the 21st Century Cures Act and the efforts made thus far by USDA, OLAW, and other federal agencies in aligning their requirements, and the discussions that have occurred in the few couple years to address reduction of PI burden as outlined in the NAS report(s).
https://www.nasfaa.org/Administrative_Burden OLAW also has a website that consolidates this information. <https://olaw.nih.gov/policies-laws/21st-century-cures-act>
 - i. In the long run, I think we need a federal Department of Biodiversity that gets away from the decentralized system we currently have.
4. Can you define FDA Indexed drugs better? What are some examples of Indexed drugs?
 - a. **Lisa Tell:** A link for defining indexed drugs is: <https://www.fda.gov/animal-veterinary/minor-use/minor-species/drug-indexing>. There are links on the FDA site for a list of indexed drugs (examples).
5. Do most AVs at Universities view their relationship with PIs (regardless of research activity) as a VCPR? It is a term used frequently in wildlife management and private practice, but I have not heard much discussion about VCPR in lab animal medicine.
 - a. Yes, VCPR is required for vets in almost all settings. In the case of lab animals, the PI is considered the client.
 - b. **Lisa Tell:** A great resource for Veterinary Client Patient Relationship is the following link: <https://www.avma.org/resources-tools/pet-owners/petcare/veterinarian-client-patient-relationship-vcpr-faq>. The attending veterinarian-PI relationship will probably depend on the particulars of the situation.
 - c. State pharmacy regs, veterinary practice acts, & regional vicissitudes of the DEA mitigate. In my case as AV, the client-owning the (non-free ranging) research animals (and the grants) is the university. VCPR in traditional sense mostly applies if we dispense drugs to a PI which is rare.
6. I'm sorry if this was covered and I missed it, but is knowing which permits are required for what field research (and where) the responsibility of the IACUC?

- a. **Mark Drew:** Not the IACUC but for sure the researcher. The IACUC should be aware of the broad picture and should check that the researcher has touched all the bases.
 - b. It is the PI's responsibility to understand and comply with permit requirements; the IACUC should be prepared to verify that proper permits are in place. This is why having committee members (including community reps) or SME consultants engaged on the committee is so important.
 - c. I see this a role that societies can/should take on as a benefit to their members (e.g., the Ornithological Council), but that requires committing resources. The guidelines put out by the societies are important, but additional expertise and consulting is really valuable.
7. What was the reason Golden Squirrels blood sampled after 3 hours?
- a. **Jim Kenagy:** The morning trapping and handling period with a field crew of three workers (from baiting traps, processing animals, and releasing all of them) was about three hours. Thus the longest any animal would have been detained in its trap would be about three hours, whereas the shortest from capture to release would have been perhaps 15 minutes. Three hours was not a sampling design, but just a default maximum holding period as a result of the field work protocol.
8. Question for Jim - how much concern do you have with food supplementation (bait from trapping) in studies tracking weight over time? Would an IACUC board would allow trapping without bait?
- a. **Jim Kenagy:** We were concerned with the energy budget to be sure, and therefore the tiny piece of bacon we used for bait in the case of these studies was reduced to be less than 3% of the daily energy budge (based on calorimetry and our other measured energetic parameters). Many rodents will enter empty box traps that are unbaited, as a matter of exploration, perhaps attracted to smells lingering from previous trapping. It would depend on the nature of the study whether it was desirable or not to trap without bait, but generally the trapping success, especially first-time trapping of an area, would likely be very poor without bait.
9. What if the institutions does not have an IACUC and is not historically engaged in animal welfare compliance for lack of IACUC requirement (ex: Zoos and some Grad schools inside Museums), who will be responsible or how will the PI know where they need to go?
- a. I see these situations as places where societies can step up if the members ask for it, and these issues are not limited to zoos and museums.

Session 5

1. Could you provide a link to the decision tree for the use of animals for the IACUC from the national park service?
 - a. **Margaret Wild:** It is in a manuscript that is in revision and will (hopefully) accepted any day and then published. Dr. Baeten, in consultation with authors at NPS, would be the one to ask about getting the decision tree.
2. It is possible for non-veterinarians to acquire federal and state DEA licenses (at least some states). Do many biologists pursue this route of getting access to controlled drugs?
 - a. **Margaret Wild:** There is a researcher license available from DEA. However, DEA registration allows for legal possession of drugs, but these are also prescription drugs that still require the VCP relationship.

- b. At our institution, a few biomedical researchers have their own licenses. There is a researcher license mechanism through the DEA and if the individual is associated with a university it is free.
 - c. **Patrice Klein:** There are 'research' categories for DEA registration. However, while non-veterinarians (or MDs) may receive a DEA registration, the pharmaceutical companies will only sell controlled substances to licensed vets.
 - d. **Mark Drew:** Yes, there is a DEA research registration but many states tie the issue up with requirements to get veterinary prescriptions for controlled substances within the state. In addition, the research registration restricts the activities with the CS to those in the research protocol and no others.
 - e. Varies by state pharmacy regs, vet practice acts, and DEA region. In GA, PIs can register with the bd of pharmacy and DEA and obtain all drugs, except those from vet compounding pharmacies, through central univ purchasing w/o vet involvement.
 - f. At my university the PI who is registered with a research DEA are able to purchase veterinary controlled and other legend drugs from Veterinary distributors.
3. Should ALL studies that involve capture of wild animals be classified as "Unrelieved Pain/Distress"? Or possibly relieved, if animals are immediately sedated?
- a. **Mark Drew:** By definition physical capture and restraint is likely in that category. But the risk of anesthesia (or tranquilization or sedation) does not necessarily make it a better option. Depends on the length of the restraint and what is being done to the animal during restraint.
 - b. **Patrice Klein:** The "Pain and Distress Category" should be evaluated and discussed by the PI and IACUC relevant to the particular study.
 - c. **David Miller:** Also depends on species'/animal's response to manual restraint.
 - d. The implication of classing capture UP/D is forcing the PI to perform alternative searches and justifications. These things should always be considered, but for wild animal studies it is almost always just an annoying exercise stating the obvious, and sours the relationship between WL PIs and IACUCs.
 - e. **L Michael Romero:** It is also important to realize that sedating drugs can also create substantial stress in the animal, which can last longer and be more stressful than the capture event itself, depending upon the length and goal of the capture event.
4. Should species, animal numbers and pain category be required for an IACUC to approve a wildlife protocol? Can annual reports of species, animal numbers and pain category substitute for this information in the original submission? Is there such a thing as a "blanket" wildlife survey protocol?
- a. **Mark Drew:** Here words matter. If the survey is for population assessment, and no behavior alterations or distress is caused by the method, then likely not. If reporting the numbers of animals surveyed or assessed is important for annual reports by the IACUC then they should be reported - total numbers of animals and methods as per the protocol approved.
 - b. **Patrice Klein:** The information on species, animal numbers, and pain category are needed for IACUC review BEFORE the study is approved and initiated. The USDA Annual Report summaries what animal activities happened over the past year - after the fact.

The 'Annual Review' is a progress report submitted by the PI to the IACUC in reference to the approved activities. - again, after the fact.

5. If wildlife research is being conducted at a zoo/museum/private organization without IACUC oversight, what responsibility does an IACUC member from another institution have to report this activity?
 - a. **Jeff Wyatt:** The responsible investigator and his/her IACUC takes ownership of the protocol and all oversight activities including personnel training of everyone involved, vet care, welfare, husbandry of the subject animals (i.e. zoo or aquarium exhibited animals)The accredited or non-accredited zoo, nature center, museum or game ranch without an IACUC may be treated as an off-site location for research by their faculty. There is lots of non-invasive, experimental behavioral research at accredited zoos and aquariums with all IACUC oversight of the subject animals accomplished by the PI's institution. Accreditation of a zoo or aquarium by AZA "should" make the PI's IACUC be less concerned about program practices (e.g. animal husbandry, housing, welfare, vet care) but the the PI's IACUC ultimately must be completely satisfied. IACUC semiannual program review and facility inspection may include documentation of the study activities and housing, husbandry, vet care and a site visit.
6. Should wildlife researchers who collect/study invasive species be required to euthanize all collected samples? What if they are non-native, but not considered invasive? When do non-native species gain native status (if ever)? Who makes these decisions?
 - a. **Mark Drew:** Depends on the species and the agency oversight. For some they require it, for some, they do not. Communication essential about what the project is about and the final result of the project.
 - b. **John A. Bryan, II:** I think a great deal of this issue rests with the states and appropriate federal agency (where applicable)..e.g., if we're talking feral swine, then lethal capture is a must; however, there are better and worse ways to go about this...informal, opportunistic hunting of feral swine has often proven to be unproductive, whereas an organized effort to capture and eliminate entire sounders has indeed helped. And it is either the state or feds that with subcontractors when do this work. So, another example of collaboration that must/should be addressed by all stakeholders.
7. Should Fish caught on hook and line be placed in pain category E? What about seine netting? Does shell notching turtles cause pain and distress?
8. I often get questions about the best ways to sterilize instruments between animals in a field situation. Some individuals use alcohol, but that is not accepted as a sterilant by some oversight organizations. What is commonly used?
 - a. **Patrice Klein:** Best to bring several sets of sterilized instruments to minimize reusing same instruments between animals without sufficient interim to re-sterilize. Alcohol does not kill spores but hydrogen peroxide will. All sterilizing agents require appropriate contact time to sterilize. Having multiple sets of instruments allows the used ones to be cleaned and placed into cold sterilization solution for proper time while other instruments are available for use.
 - b. **Daniel Mulcahy:** I have discussed the issue of sterilizing instruments for field surgeries in a couple of publications (Mulcahy 2013. Legal, ethical, and procedural bases for the use of aseptic techniques to implant electronic devices. Journal of Fish and Wildlife

Management 4(1):211-214.) An acceptable grade of surgical instruments for the use in the field are available. It is best to simply purchase sufficient sets of instruments to do all the surgeries that you want to do in a single trip and sterilize them before you leave. At one point, I had nearly 200 sets of instruments. If you are doing a very large number of surgeries, purchase enough sets to do a days worth of surgeries and get a portable autoclave. The costs of capturing and surgically implanted spectacled eiders that I implanted was \$8-10,000 per bird. The transmitter alone was \$3,000. Why try to save a few bucks and put one those animals at risk? If it dies after release, the biologist comes to the surgeon first!

9. My facility's IACUC works exclusively with PIs studying fish. The IACUC has been told to follow the AWA/AWAR "in the spirit" of its guidance and reg.s. Without specific fish standards in AWA/AWAR, can our IACUC make its own "rules" ("AWA/AWAR lite") by picking and choosing what makes sense?
 - a. **John A. Bryan, II:** This is exactly the purpose of the taxon-specific guidelines; e.g., there are published standards for activities with fish, and adherence to such standards are actually expected by organizations such as AAALAC, Int.
 - b. **Nicolette Petervary:** Assuming that the activities are not subject to the PHS Policy and Guide requirements, IACUCs have flexibility in their animal care and use programs for fish. Options would include talking to aquatic animal investigators and veterinarians, adopting AAALAC guidance, looking at guidance from professional societies and ad hoc consultants as applicable. If covered under an Assurance PHS policy and guide requirements would apply, but these supplemental information sources can help with implementation.
 - c. PHS does not fund any of our PIs' work, so we're clear there. The AFS guidelines are very helpful for putting together solid protocols, but they don't discuss program reviews, facility inspections, etc. It's the programmatic side of fish research that is proving to be problematic.
 - d. **Daniel Mulcahy:** Poikilotherms are not covered under AWA, but both the IRAC Principles and PHS policy extend coverage to all vertebrates. Therefore, you should extend much of the quality concerns to fish. BTW, the IRAC Principles (published in the Federal Register (Federal Register, May 20, 1985, Vol. 50, No. 97 (FR Doc. 85-12059) (FR 20864-20865) extends coverage to work "whenever these agencies actually perform or sponsor such procedures". Pity poor fish: so close to research, so far from the Animal Welfare Act (apologies to Porfirio Diaz).
 - e. Fitting fish into established guidelines can be like trying to smash a sturgeon-shaped peg into a mouse-shaped hole. It takes finesse. Our org. requires that we follow IRAC principles and AWA, so it's been a process of picking fish-relevant bits to build an ACUP that meets org. expectations.
10. Can you address pharmaceutical grade drugs and solutions with wildlife surgeries and euthanasia, specifically aquatic species? Ex, the use of MS-22, tricaine, should be pharmaceutical grade according to the AVMA. However, I do not see mention of pharm grade water nor pharm grade bicarb.
11. Do projects concerning urban deer population control via ovairectomy require an IACUC review and does field surgery to accomplish this meet AWA requirements?

- a. **Mark Drew:** Depends on who is going the capture and surgery. If the state agency is going to do both, it may or may not and if the project is research or management the answer may change.

Session 6

1. I'd be interested in hearing other's experiences in the effectiveness/humaneness of rapid thoracic compression. Our IACUC has reviewed the Murphy et al 2017 publication on it, but are not sure how to apply this to the broad range of species of birds.
 - a. **Jeanne Fair:** Papers continue to be published on thoracic compression in birds. e.g. <https://academic.oup.com/condor/article/120/3/617/5153009?login=true> However, IACUC (such as my own) will default to AVMA guidelines. It is also a personal preference with researchers.
 - b. **Andrew Engilis:** There are two very important papers on the RCC method. One is clinical (<https://avmajournals.avma.org/view/journals/ajvr/78/8/ajvr.78.8.887.xml>) and the other methodological (<https://academic.oup.com/condor/article/120/3/617/5153009>). There is still a misconception as to how RCC is applied, I hope our paper on the method helps in how the bird dies as a result of the method. The application to broader range of species is outlined in the methods mapper (based on size). However, an equally important consideration is when RCC could be needed as a secondary method to reduce handling time, reduce stress of an injured bird in a remote area or when free roaming with a gun in the field.
2. With regards to fin fish gear, what is the seafloor like after a bottom trawl? My understanding was that it was very harmful to the ecosystem (removing coral, seagrass, anything in it's path). Are there modifications in effect that eliminate this issue? Additionally are gill nets drifting?
 - a. **Jeff Buckel:** Yes, bottom trawling can be harmful to coral, seagrass, etc. Although there are some situations where the gear has been modified, usually the sensitive environments (coral reefs, seagrass beds) are closed to trawling. Gill nets can be drifting but, in most nearshore situations, they are anchored. Most research gill netting that I am aware of uses anchored gill nets.

Session 7

1. I may have missed this: was the study using the red nest box published? I'd love to have the reference!
 - a. **Eileen Lacey:** The paper isn't published yet! We are just about ready to submit it.
2. I may have missed it. Were those data on acclimation and stress hormones based upon mammals?
 - a. **L. Michael Romero:** It was based on studies across vertebrate taxa, including, but not restricted to mammals.
3. Can someone speak to the stress level and body mass of offspring born in captivity from wild caught animals?
 - a. **David Miller:** Many animals born into captivity do well. This is species and husbandry specific, so there are exceptions to this generality.
 - b. **L. Michael Romero:** We have not measured weight or stress hormones in captive-bred animals. The problem is deciding what the relevant reference weight should be. Since

the parents might be lighter or heavier than free-living individuals, it is not clear that the free-living weight should be the proper reference. This is especially true because of captive-bred animals being provided ad lib. food that might not be available to the free-living offspring. Stress hormone measurements are even more problematic. Several studies indicate that captivity and domestication can dramatically alter the levels and functioning of stress hormones. Again, it isn't clear what the reference values should be. Consequently, this is a difficult question to answer.

4. With regards to animals raised in captivity for release into the wild, might it also be true that animals raised in captivity may not be fully adapted to the wild? should this be taken into consideration when designing captive breed programs for the purpose of recovering wildlife?
 - a. Fish restocking programs are taking this into consideration, especially for predator avoidance. For example, in hatcheries, shadows of people are associate with feeding, in the wild that shadow will more likely be a predator (bird). Rearing protocols are changing to ensure behaviors are aligned.
 - b. **David Miller:** Reintroduction programs generally account for the fact that captive born animals need to learn to adapt to "the wild"
 - c. **Eileen Lacey:** Yes, I think those concerns do need to be taken into consideration. As examples, there are a series of studies by Ian G. McLean on the need to train captive-reared individuals to recognize and respond to predators so that they will respond appropriately after release.
 - d. **Patrice Klein:** Captive breeding programs for re-introduction are inherently long term projects that need to incorporate 'training' and preparing these captive borne animals for release to a natural habitat. This includes recognizing natural diets (foraging, hunting, etc), finding natural shelter, and avoiding predators. Having participated in several re-introduction programs many years ago, there were many lessons learned when the first releases resulted in over 60% fatalities by predators because those captive raised birds had never seen a predator. All these issues should be considered by IACUCs and the research project members.
 - e. <https://www.iucn.org/content/guidelines-reintroductions-and-other-conservation-translocations>
 - f. Having worked with a number of captive breeding programs, I believe we underestimate the change in behaviors (mating, social, feeding etc.) needed to rewild species. And it is very species dependent.
5. Were results similar regardless of differences in captive environment (housing, sounds, visuals, smells)?
6. Does anyone have any experience bringing reptiles into a captive setting? What physiological studies have been done to assess adaptation?
 - a. **Lisa Tell:** Brad Shaffer at UCLA might be a good contact/expert.
<https://www.ioes.ucla.edu/person/brad-shaffer/>
7. How do you handle bats that lack sufficient fat reserves for torpor? Unless you are artificially inducing torpor during the bats' active season, they cannot be released. Also, in my experience it can take longer than 48 hours for a bat to learn to self-feed on mealworms. What is your solution?

- a. **Michael Smotherman:** Well, they don't need fat reserves for daily torpor. They need it for hibernation during winter. That said, it is easier to transfer fall animals to captive setting because they already have more fat reserves, giving you more time to train. Yes, it often takes more than two weeks for them to learn to self-feed. These can be hand-fed until they learn. The difficult ones are those that simply don't like mealworms and never will.
- b. My solution to adapt bats to mealworms is a lot of time and hands. We don't have the option of releasing bats once in captivity and so we will continuously hand feed them for up to 4 weeks. We do euthanize the few that don't adapt by then. I have rarely had bats adapt within 48 hours.
- c. **Patrice Klein:** In my work with wildlife rehabilitators, we have found it relatively easy to get bats to eat mealworms by soaking mealworms in vitamin water, then cut up the mealworms to push out some internal contents and have the bats lick that substance. They accept the new taste and begin to eat whole mealworms within a few days. Also offer wax worms occasionally but monitor bat body weight. Bats are in rehab temporarily with the goal to release back to their natural habitat. I should qualify my comments to big brown bats, red bats, and silver haired bats (all Eastern bats). This feeding technique may not work on all bat species.

Session 8

1. Dr. Sikes, have you published clarifying the difference between euthanasia vs. humane death? Could you share that?
 - a. **Bob Sikes:** The ASM Guidelines deal with euthanasia and humane killing on pg 682 (http://www.mammalogy.org/uploads/committee_files/CurrentGuidelines.pdf). Further treatment of this issue will be included in the revision of these guidelines, which is presently underway.
2. Why not have IACUCs give 'provisional' go aheads with language "approval has been granted with the understanding that the PI will acquire any necessary permits before starting work"?
 - a. **Bob Sikes:** There needs to be explicit language stating that all applicable permits, licenses, and authorizations must be in place prior to the initiation of work.
 - b. **Patrice Klein:** The IACUC approval process is to address animal welfare concerns. Approval indicates that IACUC accepts the animal activities to be conducted in the study and by whom (trained personnel). The study cannot commence until the federal and state wildlife agencies have issued collection permits based on their authorities. Therefore, 'provisional' IACUC approval is not appropriate. However, IACUCs should include a statement in their Approval Letter to acknowledge that all fed/state permits must be issued before any animal field work can be conducted.
 - c. **Michael Stoskopf:** Actually not provisional but approvals can be granted with the understanding that all permits will be obtained before work can start. Many IACUCs use this approach.
3. Veterinary Verification and Consultation (VVC) seems like a good solution to deal with issues that pop up in the field. But the issue is that these changes are supposed to be within IACUC approved SOPs and it is difficult to have SOPs for all wild species. Do others use VVC for wildlife?

- a. **Patrice Klein:** Veterinary Verification and Consultation (VVC) is used by some IACUCs for wildlife but the VVC has its limitations on what the Attending Veterinarian can approve. Please see OLAW website for details on VVC.
 - b. **Elaine Kim:** I suggest looking at the type of amendments most common in that field of work, and then to develop a policy or sop around them, if they qualify for VVC of course.
 - c. Check with OLAW, as VVC typically captures activities where DDP, distress/discomfort/pain, are being reduced/not increased. Am currently working on our Assurance renewal and am having a robust conversation with the agency about the VVC & DDP levels.
4. Not all PI's think to tell the IACUC that their permits have "no release" caveats. We ran into the snake head issue, too. The PI was 3000 animals or more above his IACUC approved limit (larvae). Do you put prompts regarding permits in the wildlife portions of protocols? Any examples of wording?
 - a. Perhaps something simple as a statement, have all permits, etc been provided to the IACUC for review.
 - b. **Michael Stoskopf:** This largely is a communication issue between investigator and the IACUC. If the investigator is aware of the requirement they should include it in their application for IACUC approval. But it is not uncommon that when a permit is issued the investigator may become aware of an obligation they did not know they would have. In that case they need to know they should notify their IACUC of the potential that they may have to take actions based on the permit requirements that don't fit the original projections for the study. In the scenario mentioned, snake heads being required to be euthanized in a collection protocol that otherwise did not include any planned lethal take. The IACUC can then request amendment as to how the investigator will conduct the take. A huge problem is estimation of the number of animals that might be involved and generally IACUC's can suggest the investigator select a large number that would likely encompass the worst case scenario. It is not uncommon for an investigator to think they should keep the number as small as possible, which is not really necessary.
5. As a wildlife rehabilitator, IACUC community member, and chair of the White Nose syndrome stakeholder committee, I suspect I am the only layperson here. How do you all communicate with your community members when terminology is confusing? How do you react to their questions?
 - a. **Elaine Kim:** We talk with our members regularly and check in with them to make sure they are getting their questions answered, especially when it comes to protocol information and terminology. The IACUC admins and Chair should be helping maintain member engagement and this is part of it, I believe.
 - b. **Patrice Klein:** IACUCs should be considerate of their 'non-affiliated' or community members to provide basic Animal Welfare Act and PHS/OLAW training; and address any questions they may have about IACUC process. Also to recognize their input is essential for the proper function of the IACUC to address animal welfare concerns. They should be provided access to all IACUC SOPs and policies.
 - c. We talk to each other. They don't hesitate to ask questions; we are all comfortable with each other and email/talk readily.

- d. I agree, and my IACUC is very good about that. However, I've encountered some PIs who seem to view the community member as a lower life form, and are not terribly willing to speak to me directly in a protocol review simply because I am not a scientist.
- e. **Michael Stoskopf:** This can be a very real challenge, but in my experience I have found that assuming the community members are both intelligent and interested, and avoiding acronyms and using common language rather than techno jargon, or legalese works very well.