**ILAR J**

Volume 56, Number 3, 2015

***Insight Gained from Wildlife Research in the Context of Global Anthropogenic Change***

**Bryan II and Sikes. Introduction to Insights Gained from Wildlife Research in the Context of Global Anthropogenic Change, pp. 272-274**

Domains 1, 3, 4, 5 and 6

SUMMARY: This issue of the ILAR Journal offers a diverse consortium of wildlife topics ranging from policy to conservation to disease investigation, all against the backdrop of the complexities of effective compliance and oversight when the research subjects are wild. The articles also provided insights into the complex dynamic that is animal welfare in the framework of wildlife research from diverse perspectives. The material presented in this issue contributes to our philosophies on research animal welfare while simultaneously introducing the research animal professional to new perspectives. The authors mentioned a summary of the following topics to be expanded in the ILAR issue: 1) A broad approach for wildlife research and oversight. 2) Guidance for field biology and other studies on wildlife species. 3) The wildlife research and the benefits of studying panzootic disease. 4) Elephant endotheliotropic herpesvirus and hemorrhagic disease. 5) Polyomavirus in Raccoons. 6) Wildlife pathology and public knowledge. 7) Animal welfare policy, and 8) IACUC considerations.

QUESTIONS (True or False)

1. In no traditional laboratory animal research, the purpose often involves obtaining greater clarity of some aspect of human health through the manipulation of nonhuman animal models.
2. Human health benefits may indeed derive from wildlife research, but such benefits are generally secondary and not part of the main objectives.
3. The necessary use of appropriate guidelines for effective evaluation of wildlife activities by oversight bodies sets the stage for needed discussions among individuals from all segments of the animal research enterprise.
4. The authors introduce the idea of ecosystem harm in the context of species conservation efforts. As a primary example of this consideration, the authors discuss the complexities of studying white-nose syndrome in bats as a means toward species conservation, while simultaneously considering the potential harm research activities might pose to the very ecosystem under study.
5. Suggesting a sporadic etiology, the authors outline the lack of complexities of addressing such a ubiquitous disease in a wild species that is inherently difficult to handle and within the context of developing effective diagnostic tools and treatment plans.
6. Polyomavirus infections have been well described in human populations where they do not often cause disease; however, Dr. Patricia Pesavento and colleagues present herein that much has yet to be learned concerning the mechanisms behind polyomavirus infection, especially regarding tumorigenesis.
7. Dr. Tracy McNamara describes a paradigm shift in how public health engages issues of zoonotic concern by addressing spillover events only after they have impacted human populations; in other words, a purely reactive approach. He suggests that a reactionary model could be supplanted by a proactive disease investigation model.
8. The importance of the detailed presentation in the regulations and policies applicable to research with wild species and the resources available to the animal welfare oversight bodies/committees charged with reviewing wildlife research protocols. One appendix is a protocol template designed specifically for wildlife activities that was developed to extract the information needed by oversight bodies for effective review of such activities.
9. The wildlife research requires a somewhat different set of considerations and standards from the conventional models focused on traditional laboratory animals and domesticated species.

ANSWERS

1. F

2. T

3. T

4. T

5. F

6. T

7. T

8. T

9. T

**Reeder et al. Balancing the Costs of Wildlife Research with the Benefits of Understanding a Panzootic Disease, White-Nose Syndrome, pp. 275-282**

Domain 3, Task 2- Research; Advise and consult with investigators on matters related to their research

SUMMARY: This article uses white-nose syndrome (WNS) in bats as a case study to discuss considerations for wildlife research. In North America, WNS has caused a 90% decrease in bats in many affected hibernacula and the predicted regional extinction of at least 2 North American bat species. Signs of WNS include emerging from hibernation early, death with little to no remaining fat stores, and white fungal growth on the muzzle, wings, and ears. The causative agent is *Pseudogymnoacus destructans* (Pd), a cold-loving fungus that invades the epidermis and dermis of hibernating bats, leading to a series of physiological changes that result in mortality for some bats. Europe has a widespread presence of Pd with no reports of mortality, leading to the hypothesis that Pd is a novel pathogen introduced anthropogenically from Europe to which European but not North American bats are adapted. Pd is a highly virulent pathogen, temperate, insectivorous, hibernating bats are the susceptible hosts, and their hibernacula (cold and humid caves and mines) provide the environment conducive to pathogen proliferation. Pd exploits the physiology of hibernation, and it does not persist on bats during the summer.

When studying wildlife diseases such as WNS, the harm of collecting and causing potential disturbances to ecosystems must be weighed against the potential knowledge gained and its practical consequences. IACUCs must apply the 3 Rs in an altered manner for field research. Researchers studying free-ranging animals must take into account the harms to larger populations (e.g. colonies or species) and to networks of organisms (e.g. ecosystems) and not just the effects on the individual organisms being studied. Extending the 3 Rs to incorporate ecologic harms is unique to field research. Incursions into wilderness areas will potentially disrupt the normal behaviors of animals or introduce invasive species. Good decontamination practice is critical. Using the replacement principle, researchers must ask if it is possible to conduct the study in a more robust ecosystem. In WNS research, naïve populations are more robust than those in crisis or remnant populations, but extra care must be taken to prevent anthropogenic spread. In the spirit of reduction, if animals must be removed from the wild, the minimum number needed should be used. Field studies should be refined to minimize the amount of harm to the animals and should maximize the knowledge gained without additional ecosystem costs by combining studies when possible and saving all biological samples.

If wild animals are moved into captivity, a significant stressor, studies should minimize the impact of captivity on results. Husbandry guidelines laid out in The Guide are not necessarily relevant. Taxon-specific guidelines (via various associations), rehabilitation and zoo experts, and veterinarians and other experts with experience handling related species should be consulted. Each investigator should document whether taxon-specific guidelines exist, and follow those guidelines. If they do not exist, the investigators should document how they determined the husbandry plan and deemed it appropriate for the species.

Only by understanding an ecologic crisis in the context of the ecosystem can we provide conservationists with the tools needed to mitigate the threat and avoid wasting scan resources.

QUESTIONS

1.  White nose syndrome in bats is caused by:

a.  Mycobacterium avium complex

b.  *Pseudogymnoacus destructans*

c.  *Klebsiella pneumonia*

d. *Yersinia pseudotuberculosis*

2. The agent that causes WNS in bats is a:

a. Bacteria

b. Virus

c. Fungus

d. Prion

3.  True or False: White nose syndrome in bats has a higher mortality rate in Europe than in North America.

4.  True or False: Arthropod vectors are important in the spread of white nose syndrome.

5.  True or False: The Guide may not be the best resource for husbandry practices with wild animals brought into captivity.

ANSWERS

1. b

2. c

3. False

4. False

5. True

**Long et al. Review of Elephant Endotheliotropic Herpesviruses and Acute Hemorrhagic Disease, pp. 283-296**

Domain 1, Task 4 - Treat disease or condition as appropriate

SUMMARY: More than 100 young captive and wild Asian elephants are known to have died from a rapid-onset, acute hemorrhagic disease caused primarily by multiple distinct strains of two closely related   
chimeric variants of a novel herpesvirus species designated elephant endotheliotropic herpesvirus (EEHV1A and EEHV1B). These and two other species of Probosciviruses (EEHV4 and EEHV5) are evidently ancient and likely nearly ubiquitous asymptomatic infections of adult Asian elephants worldwide that are occasionally shed in trunk wash secretions. Although only a handful of similar cases have been observed in African elephants, they also have proved to harbor their own multiple and distinct species of Probosciviruses-EEHV2, EEHV3, EEHV6, and EEHV7- found in lung and skin nodules or saliva. For reasons that are not yet understood, approximately 20% of Asian elephant calves appear to be susceptible to the disease when primary infections are not controlled by normal innate cellular and humoral immune responses. Sensitive specific polymerase chain reaction (PCR) DNA blood tests have been developed, routine monitoring has been established, the complete large DNA genomes of each of   
the four Asian EEHV species have now been sequenced, and PCR gene subtyping has provided unambiguous evidence that this is a sporadic rather than epidemic disease that it is not being spread among zoos or other elephant housing facilities. Nevertheless, researchers have not yet been able to   
propagate EEHV in cell culture, determine whether or not human antiherpesvirus drugs are effective inhibitors, or develop serology assays that can distinguish between antibodies against the multiple   
different EEHV species.

QUESTIONS

1. T or F.   Systemic treatment of acute hemorrhagic disease caused primarily by multiple distinct strains of two closely related chimeric variants of a novel herpesvirus species designated elephant endotheliotropic herpesvirus (EEHV1A and EEHV1B) can be treated with the drug famciclovir  
   (FCV), which is used to treat human herpes simplex virus infections.
2. T or F.   Elephant endotheliotropic herpesvirus (EEHV1A) has been shown to be a non-sporadic, and involves a single strain easily transmitting from one zoo facility to another during breeding procedures.
3. It is reasonable to interpret that there are relatively fewer and reduced opportunities to transmit EEHV1A in captivity than among wild herds.

ANSWERS

1. T

2. F. Many different strains and no one strain has been identified as the  
same from zoo facility to another.

3. T

**Pesavento et al. Polyomavirus and Naturally Occurring Neuroglial Tumors in Raccoons (Procyon lotor), pp. 297-305**

Domain 3: Research; Task 3 – Design and conduct research

Tertiary Species: Other mammals

SUMMARY

* Persistent viruses are common in humans and animals
* Low replication + natural/enhanced cell turnover  viral maintenance and shedding  no clinical sequelae in most cases
* Millions of years of coevolution co-opting cell cycle molecular machinery, cooperation with host or evasion of host immune system
* Clinical sequelae (e.g. cancer) usually occurs in the face of an altered host response (e.g. immunosuppression)
* Complex relationship between host and virus so it cannot be studied by experimental infection or in cell culture systems alone
* Raccoon polyomavirus (RacPyV)
* Family = Polyomaviridae; discovered in 2010 in neuroglial tumors in free-ranging raccoons
* Increased number of raccoons in a geographic location found to have neuroglial tumors  suspicion of an environmental factor  detection of a novel PyV within tumor tissue
* Double-stranded genome: transcription in one direction  tumor antigen (TAg) proteins and gene transcription from the opposite strand  structural capsid viral proteins (VP); genome separated by a noncoding regulatory region (replication and promotors)
* May be a good model for a similar condition in humans since it is a naturally occurring viral-induced tumor
* Merkel cell polyomavirus (MCPyV)  Merkel cell carcinoma (MCC; rare but highly fatal skin cancer)
* MCC usually occurs long after infection with MCPyV and integration is an essential step in transformation
* Mechanisms that cause this switch from persistent infection to cancer are difficult to study in humans
* JC polyomavirus (JCPyV) is the only human PyV known to cause disease in the brain
* Persists in the kidney + immunosuppression of host  travels to the brain via persistently infected B cells  progressive multifocal leukoencephalopathy (PML)
* Stem or progenitor cell target = neuroepithelial origin
* Coexpress neuronal (β-iii-Tubulin) and glial fibrillary acidic protein (GFAP) markers
* TAg binds to bromodomain-containing protein 4 (BRD4) involved in transcriptional regulation of embryonic stem cells
* Widespread deposition in tissues pointing to a possible hematogenous spread
* Skin and kidney – possible sites of shedding
* Uterus and placenta – possible route of transmission
* Polyomaviridae
* Nonenveloped, double-stranded DNA tumor viruses
* Three genera
* Avipolyomaviruses (avian)
* Wukipolyomaviruses (mammalian)
* Orthopolyomaviruses (mammalian)
* Subset = Almipolyomaviruses (includes MCpyV and RacPyV)
* Express large TAg (LT)
* Required for viral DNA replication and gene expression
* Bind and alter many host cellular proteins
* Express small TAg (sT)
* Aids in viral DNA replication
* Binds to and inhibits protein phosphatase 2A (PP2A)
* Seroprevalence rates are high in both humans and animals
* Timing of infection and mode of transmission remain unknown
* Proportion of the population with antibodies increases with age (humans and raccoons)
* Horizontal (e.g. cohabiting family members, source outside the home) and vertical transmission (viral DNA found in placental and fetal tissue) may be possible
* Immediate need to coordinate wildlife pathogen surveillance efforts with investigations of human disease outbreaks especially in light of the rapid rate of world urbanization
* A natural host model is crucial to better understand questions of host/pathogen interactions and pathogenesis
* Conclusion:  Important future work will include studying how interactions between the host cell, virus and tumor microenvironment regulate the outcome of viral infection and promote uncontrolled cell growth versus a quiescent, persistent infection.

QUESTIONS

1. Name the polyomavirus that was a tissue culture contaminant of a polio vaccine that was widely administered in the early 1960s.
2. T/F: Many persistent viruses utilize and manipulate components of the host cell cycle to maintain their own genome.
3. Name three reasons that tissue resident stem cells may provide an attractive cell for infection and maintenance of a persistent viral state.
4. Define “species-jumping.”

ANSWERS

1. Simian vacuolating virus 40 (SV40; polio vaccine was manufactured using rhesus macaque kidney cells that were contaminated with the virus)
2. True
3. Long-lived, typically quiescent (rarely enter the cell cycle) and have immunomodulatory effects (capable of downregulating T cells, B cells and NK cells  infected cells escaping detection)
4. Infection of a new species due to potential pathogen evolution that can occur when there is a high population density at a human-animal interface

**McNamara. Wildlife Pathology Studies and How They Can Inform Public Health, pp. 306-311**

Domain 3: Research

SUMMARY: Emerging zoonoses have a serious impact on human and animal health.  Much can be gained by the study of wildlife pathology in predicting public health crises yet close enough relationships between public health, veterinary, and wildlife agencies have historically been lacking.

Most emerging infectious diseases (EIDs) are zoonoses (60.3%), of which a majority (71.8%) originated in wildlife. Rodents and bats are particularly associated with many zoonoses such as Hantavirus, Lassa fever, Nipah virus (NiV), Hendra virus and SARS. Despite this, few research and surveillance programs are specifically aimed at wildlife. Additionally, wildlife agencies are critically underfunded worldwide.

Human activity is the driving force for where and how many zoonoses occur. For example, Kyasanur Forest disease occurred in previously undisturbed forest where land was cleared for a tree plantation. Argentine hemorrhagic fever was linked to corn production.  NiV infection was a result of expanding pig farms into bat habitat. NiV is also a serious problem in Bangladesh and India because bats and people both consume raw date palm sap collected from trees and cross contamination occurs. Bush meat trade has been implicated in recent Ebola outbreaks.

Destruction of bat populations is unfeasible and ill advised, despite some populist opinion. The bat immune system is tolerant of pathogens, and has evolved mechanisms to control viral replication more effectively than most mammals. The ability to fly in bats has resulted in an increased metabolic rate, and persistent fever-like state which keeps viral replication at a low level. Bats also have high concentrations of genes in the DNA damage checkpoint and they are missing a gene segment known to trigger cytokine storms.  They also live 3-10 years longer than similarly sized mammals and have low cancer rates. We would benefit from more research on the bat immune system.

Systematic wildlife surveillance programs don’t exist in most countries despite the history of benefit.

The 1999 WNV outbreak is a great example of how animal studies contributed to public health. Veterinary serum banks provided insight into when the disease first appeared in NYC, and the ability to follow captive wildlife over time provided the first indication of viral persistence. Many features of the virus pertinent to human health were identified by veterinary pathologists. A broad range of species at the Bronx Zoo was infected with WNV. Tissues, serum, and testing revealed a lot of information about when WNV first appeared in the Bronx. Too little emphasis is placed on the value of these materials. Dead bird surveillance programs across the US tested for WNV but failed to save and bank negative samples which may have been useful in detection of other diseases later. Animal studies also helped identify alternative modes of transmission of WNV (aerosol/fecal-oral/organ transplant), and presence of persistent neurologic issues.

The Emerging Pandemic Threats (EPT) program was launched in 2009 and is an exciting example of recent synergy across human and animal health sectors.

QUESTIONS

1. The bat immune system supports or causes:

a. Rapid clearance of virus

b. A high incidence of neoplasia

c. Low levels of persistent viremia

d. High fevers leading to seizures

2. West Nile Virus can be transmitted in the following ways:

a. Fecal/oral

b. Mosquito bite

c. Aerosol

d. Breastfeeding

e. All of the above

ANSWERS

* 1. c
  2. e

**Paul et al. Animal Welfare Policy: Implementation in the Context of Wildlife Research – Policy Review and Discussion of Fundamental Issues, pp. 312-334**

Domain 5: Regulatory Responsibilities

T2. Advocate for humane care and use of animals

T5. Serve as a member of an IACUC

T6. Review protocols and provide advice to investigators and the IACUC

SUMMARY

Abstract: The use of vertebrate animals in research and education in the United States is subject to a number of regulations, policies, and guidelines under the immediate oversight of Institutional Animal Care and Use Committees (IACUCs), which are charged with ensuring the ethical and appropriate use of the animal subjects. In almost all instances, this regulatory and oversight landscape of animal use has been developed around domesticated animals in biomedical research environments. When the research activities involve wild species, especially in their natural habitat rather than a laboratory, oversight personnel and investigators alike struggle with determining what constitutes ethical and appropriate activities. These difficulties stem from fundamental differences in biology between wild and domesticated animals and from the differences in research objectives and methods in wildlife compared with biomedical research. Here we discuss the various policies, regulations, and guidance documents for animal use in the context of wildlife research. We compare the expectations of the various oversight agencies and how these expectations are met when working with wild vertebrates. We make recommendations for how IACUCs can use available resources to ensure that activities involving wild species are conducted in compliance with existing regulations and policies and in ways that are biologically appropriate for these nondomesticated species.

KEY POINTS

The National Science Foundation (NSF) funds most federally supported wildlife research. The NSF Grant Proposal Guide <http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_index.jsp> makes clear that investigators must work in compliance with the Animal Welfare Act, must have IACUC approval for their work, and the granting institution must hold a current PHS-approved Assurance. Finally, NSF requires grantees to follow recommendations from the *ILAR Guide* and from taxon-specific guidelines from taxon-based scientific organizations, including the American Society of Ichthyologists and Herpetologists, the American Society of Mammologists, and the Ornithological Council.

* There are a number of key differences between wildlife research and biomedical research
  + Focus of the animal use:
    - Biomedical research uses animals as model organisms to study specific diseases or conditions and biological processes and responses in health and disease.
    - Wildlife studies study the animal subjects to better understand the biology, behavior and environment of the wild animals themselves; i.e. – they are studied for their own sake, and not as models for other organisms or specific biological processes.

o   Research settings

* + - Biomedical research settings are highly controlled (environment, number of animals, gender, genetics, etc.)
    - Wildlife research often takes place in the animals’ natural habitat, with field study conditions dictated by the environment itself. Even when wild animals are housed in captivity for studies, they often have husbandry needs that might be considered exceptions to standard laboratory animal housing requirements.
* The understanding of, and definition for, certain words and phrases can be somewhat different for wildlife studies as opposed to biomedical studies. There are differences in, or even lack of, definitions for some of these, from various common sources, including the Animal Welfare Act (AWA), PHS Policy, AVMA Euthanasia Guidelines. Among these words are: animal, euthanasia, field study, principal investigator, study area, animal facility, study site, field site, thoracic compression/cardiac compression.
* A common point of concern among wildlife investigators and their IACUCs is the question of what regulations, policies and guidelines apply to work with wildlife.
  + For institutions with a PHS Assurance, the Assurance can be written to exclude non-PHS funded research at an institution. In such cases, with many wildlife research projects funded by other than PHS, those projects wouldn’t come under PHS oversight if they have been clearly excluded from the Assurance.
  + According to the “NSF Grant Proposal Guide” and in relation to the August 2015 Memorandum of Understanding (MOU) between OLAW and the NSF, OLAW will negotiate Assurances for NSF-affiliated institutions that do not receive direct PHS support for live vertebrate animal research.
    - With regard to standards for animal care, the “Grant Proposal Guide” directs that taxon-specific guidelines will be followed, as opposed to the recommendations in the *Guide for the Care and Use of Laboratory Animals*. The *Guide* itself says little about wildlife research in the field or in captivity. The *Guide*’s section about field investigations is less than a page long, and doesn’t acknowledge the fact that wild vertebrates are often studied in captivity.
* Whether wildlife field studies come under federal policies and guidelines is another gray area,
  + Starting with the AWA definition of field studies: “Field study means a study conducted on free-living wild animals in their natural habitat. However, this term excludes any study that involves an invasive procedure, harms, or materially alters the behavior of an animal under study”, then having to apply definitions for “invasive procedure”, “harm” and “materially alters behavior”, for which no AWA definitions are present.
  + PHS Policy doesn’t mention filed studies, but there is an OLAW FAQ that states that “the IACUC must know where field studies will be located, know what procedures will be involved, be sufficiently familiar with the nature of the habitat to assess the potential impact on the animal subjects, and review the protocol if the activity alters or influences the activities of the animal(s) that are being studied. Again – these are not defined.
* Whether site inspection for field sites is required, and what would be considered acceptable standards for IACUC inspection are discussed. OLAW FAQ section E.4 acknowledges the difficulties for many such situations, and states that on-site inspections are not required. It offers alternatives including good written protocols describing the husbandry and research-related activity (including researcher safety), along with possible photographs or video of devices and sites.
* Standards for housing of wildlife species in captivity are discussed. There is reference to the use of taxon-specific guidelines; both from taxon specialty groups and from Animal Care Manuals for various taxa/species from the Association of Zoos and Aquariums (AZA), AZA related periodicals and AZA members.
* Transport of wild animals is discussed. This includes pointing out that the *Guide* contains inaccuracies and incomplete statements when it comes to international regulations and standards for international movement of some wildlife. The discussion does point out that if a protocol involves transport of wild research animals, those methods should be part of the protocol.
* Cost-benefit (Harms/benefit) assessment of wildlife research is a topic presented in this article, and discussion points are made for the contexts of wildlife research that can be used to help with such an assessment. This starts with the fact that most wildlife research is carried out with the awareness that the knowledge gained is often beneficial to the wildlife taxa being studied.
* Viewing wildlife research in relation to Russel and Burch’s 3Rs is discussed. It is stressed that replacement generally is not applicable to wildlife studies, due to the oft-stated goal to be to study the particular species/taxa of interest. Use of statistical planning is mentioned with regard to reduction. The third R, refinement, is held up as the “guiding paradigm for all wildlife research”, and that “refinement is really the only one of the 3Rs that is always applicable to wildlife research”.
* The article asks whether IACUCs should consider potential impacts on the research animal populations, and extends that thought to include other individuals or species that may be affected by the researcher’s presence or study methods. Acknowledging that this could be an IACUC concern, it points out that the expertise to assess this generally lies outside the IACUC membership, and often it is best to rely on the permitting agencies and institutions who review the research in the context of conservation needs and environmental impacts.
* For researcher training, it is mentioned that many of the common research topics required by institutions for researchers are not applicable, and therefore not necessary. It mentions some sources for more specific wildlife research training. As to hands on-procedures, the article points out that generally that training is passed down among the specialist wildlife researchers, with related one-on-one training the general circumstance.
* Occupational health for personnel working with wildlife and in the field environment is discussed. The article states that, while such purview is not a legal requirement for IACUCs, many institutions have in fact delegated such responsibility to their IACUC. It mentions the diverse nature of health and safety threats to workers, from zoonotic disease to physical-injury (including venomous animals) to physical environment, including weather conditions.
* With regard to post-approval monitoring, the most practical method for compliance-assessment is to require formal reports asking for a list and description of any instances of deviation from the protocol, or of unanticipated consequences, and the reason for the deviation.
* Whether wildlife studies should be included in the annual reports to APHIS is discussed. The discussion revolves around the *Animal Welfare Inspection Guide* and the description of field studies:   
  The Annual Report should not report any animals used for the following:

Field studies which meet the following criteria and are therefore exempt from the regulations and do not require a written, approved exemption. The study does not: [1.1, 2.31(d)(1)]

Harm the animals under study

Involve an invasive procedure

Materially alter the behavior of the animals under study

Animals euthanized, killed, or trapped, and collected, such as for study or museum samples, from their natural habitat via humane euthanasia.”

* The article makes a point of discussion a special consideration for wildlife research: euthanasia methods. It includes a quote from the 2013 AVMA Euthanasia Guidelines
  + “When settings are atypical, methods normally not considered appropriate may become the method of choice. Under such conditions, the humaneness (or perceived lack thereof) of the method used to bring about the death of an animal may be distinguished from the intent or outcome associated with an act of killing. Following this reasoning, *it may still be an act of euthanasia to kill an animal in a manner that is not perfectly humane or that would not be considered appropriate in other contexts*.”
  + Among the methods discussed are thoracic (cardiac for birds) compression and gunshot, as well as the difficulties for using methods that are more common in traditional laboratory animal settings.
* A second special consideration for wildlife research is the topic of whether and when to release wildlife that have been kept in captivity. The bottom line is that this is generally not advisable, for a variety of reasons, including modifications in the environment (including other animals) since the animal was captured, predators in areas an animal is not used to or aware of in a new wild environment, introduction of disease or alterations of genetic/ecological integrity of the population at the release site, etc.
* Finally, there is a discussion of whether the Animal Welfare Act applies to federal agencies. Basically, the article notes that the AWA does apply to all federal agencies, and the requirements for them are the same as for nonfederal institutions, with the exception that those other federal agencies do have the requirement to report annually to APHIS. Instead those agencies are required to report deficiencies and deviations from the AWA to the head of the particular federal agency.

QUESTIONS

1. Which of the following is true about all projects proposed for NSF funding?

a. The project must have been approved by the submitting PI’s IACUC

b. The submitting institution must have a current Public Health Service (PHS) Approved Assurance

c. The submitting institution must be registered with the USDA as a research facility

d. All of the above

e. a and b

2. True or False: in addition to The Guide for the Care and Use of Laboratory Animals, taxon-specific guidelines have been created by taxon-oriented scientific societies to assist with wildlife research planning and for wildlife research protocol review guidance.

3. What is the name of a key guidance document for people applying to the National Science Foundation for support of their wildlife research?

4. What is the Animal Welfare Act definition for “field study”?

5. True or False: for six month inspection of field sites, rather than physical inspection of a site, an IACUC may use written descriptions, photographs or videos that document specified aspects of the study site.

6. True or False: when wild animal species are kept in captivity, their husbandry must strictly follow guidelines for cleaning and sanitation as practiced with standard laboratory animal species.

7. What is the one “R” among Russell and Burch’s “3 R’s” that is always applicable to wildlife research?

8. What method for assessing the impact of wildlife research on populations is a key to giving the IACUC assurance that research activity impacts on animals that are not actually used in the study have been considered and are likely to be acceptable?

9. True or False: Animals involved in field studies are not required to be part of an institution’s annual report to APHIS Animal Care.

10. List at least two methods for euthanasia that may be used in wildlife studies that would not be considered acceptable in the laboratory research setting.

11. True or False: Investigators and institutions should do all that they can to return wild animals brought into captivity for research back into the wild once a project is completed.

12. True or False: the Animal Welfare Act applies across the board to other federal agencies.

13. True or False: application of standards in the ILAR *Guide* can be biologically inappropriate, and even inhumane, when applied to the care and use of a wild animal species.

ANSWERS

1. e (a and b)

2. True

3. “The National Science Foundation Proposal and Award Policies and Procedures Guide” (“NSF Grant Proposal Guide”)

4. Under the Animal Welfare Act, “field study means a study conducted on free-living wild animals in their natural habitat. However, this term excludes any study that involves an invasive procedure, harms, or materially alters the behavior of an animal under study”.

5. True

6. False

7. Refinement. With new knowledge and technology, it is always legitimate to look for methods that will generate information needed while alleviating or minimizing negative research impacts.

8. The requirement for permits from international, federal and state conservation agencies with oversight over those animals and their habitat.

9. True (most of the time)

10. Gunshot, thoracic (cardiac with birds) compression

11. False

12. True – with the exception that those other federal agencies do not have the requirement to report annually to APHIS, instead being required to report deficiencies and deviations from the AWA to the head of the particular federal agency.

13. True

**Sikes and Bryan II. Institutional Animal Care and Use Committee Considerations for the Use of Wildlife in Research and Education, pp. 335-341**

Domain 3: Research

Domain 5: Regulatory Responsibilities

Introduction: The use of living animals in research and education carries with it the ethical expectations of humane and appropriate treatment of subjects. These ethical expectations are supported by regulations in most countries to provide research subjects some degree of protection. Countries might differ in terms of which taxa are covered and how regulations are applied across the covered taxa, but regardless of country, species, or research focus, oversight bodies and personnel at all levels frequently struggle when evaluating activities involving wildlife species within the ethical and legal framework of animal research.

SUMMARY: Institutional Animal Care and Use Committees or other institutional review committees can meet their responsibilities in these disparate types of animal activities only by using resources tailored to the animals and situations encountered. The authors review the issues and the resources that facilitate effective oversight of such activities in the wildlife research arena available to researchers, institutional review committees, regulatory bodies, and accrediting bodies. Issues covered include an understanding of the fundamental differences between wildlife research and biomedical research; the profound differences between wildlife species and traditional laboratory subjects, most of which are domesticated animals; and the unique issues presented when the research subjects are members of wild populations and communities. The authors review the resources available for effective oversight of wildlife projects and emphasize that competent oversight of wildlife research demands the use of appropriate resources. These resources include guidelines designed for the use of wild species (taxon-specific guidelines) and protocol forms tailored for the species and situations encountered.

QUESTION

1.  In the United States, the Institutional Animal Care and Use Committee’s (IACUC’s) responsibilities are mandated in which regulatory documents?

a.  Animal Welfare Act (collectively AWAR [USDA 2013]) and Public Health Services (PHS) policy (NIH-OLAW2015)

b.  GUIDE and ILAR

c.  Animal Welfare Act (collectively AWAR [USDA 2013]) and GUIDE

d. Public Health Services (PHS) policy (NIH-OLAW2015) and GUIDE

e.  Public Health Services (PHS) policy (NIH-OLAW2015) only

ANSWER

* 1. A.   Animal Welfare Act (collectively AWAR [USDA 2013]) and Public Health Services (PHS) policy (NIH-OLAW2015)