

# Does the Animal Welfare Act Apply to Free-ranging Animals?

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## Abstract

Despite the long-standing role that institutional animal care and use committees (IACUCs) have played in reviewing and approving studies at academic institutions, compliance with the Animal Welfare Act (AWA) is not always complete for government natural resource agencies that use free-ranging animals in research and management studies. Even at universities, IACUCs face uncertainties about what activities are covered and about how to judge proposed research on free-ranging animals. One reason for much of the confusion is the AWA vaguely worded exemption for “field studies.” In particular, fish are problematic because of the AWA exclusion of poikilothermic animals. However, most university IACUCs review studies on all animals, and the Interagency Research Animal Committee (IRAC) has published the “IRAC Principles,” which extend coverage to all vertebrates used by federal researchers. Despite this extended coverage, many scientists working on wild animals continue to view compliance with the AWA with little enthusiasm. IACUCs, IACUC veterinarians, wildlife veterinarians, and fish and wildlife biologists must learn to work together to comply with the law and to protect the privilege of using free-ranging animals in research.

**Key Words:** Animal Welfare Act; fish; free-ranging animal; IACUC; IRAC Principles; veterinarian; wildlife; wildlife veterinarian

## Legislation

The Animal Welfare Act (AWA<sup>1</sup>) was originally passed in 1966 (Public Law [PL<sup>1</sup>] 89-544) with amendments (PL 91-579, PL 94-279, and PL 99-198), and is codified in Volume 7 of the US Code (7 USC) §§2131 et. seq. and 39 USC 3001, with regulations and standards appearing in Title 9 of the Code of Federal Regulations (9 CFR),

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<sup>1</sup>Abbreviations used in this article: AWA, Animal Welfare Act; APHIS, Animal and Plant Health Inspection Service; IACUC, institutional animal care and use committee; IRAC, Interagency Research Animal Committee; PL, public law; USDA, US Department of Agriculture.

Chapter 1, Subchapter A, parts 1, 2, 3, and 4. The current law and regulations are clearly written with a view toward the care and use of captive animals for display and for research. The application of the AWA to the study of free-ranging animals is, at first glance, less clear. Although the AWA grants an exemption to field studies, “field study” is defined in the glossary of the AWA as “. . . any study conducted on free-living wild animals in their natural habitat, which does not involve an invasive procedure, and which does not harm or materially alter the behavior of the animals under study.” Few wildlife studies can be performed without involving an invasive procedure, the potential for harm, or altering the behavior of the animals.

Although the AWA makes no exceptions to its coverage of vertebrates, when the regulations were written, the Secretary of Agriculture exempted birds, rats (*Rattus* spp.), and mice (*Mus* spp.). Recently, the US Department of Agriculture (USDA<sup>1</sup>) reached a settlement in a lawsuit over the exclusion in regulations of birds, rats, and mice, to extend coverage of the AWA and its attendant regulations to these animals. However, in 2002 Congress passed a law specifically excluding these animals from coverage by the AWA, effectively ending the process, if not the debate, of inclusion of these animals. By definition, poikilothermic and invertebrate animals are excluded from coverage of the AWA. In practice, most universities have extended coverage to all mammals, and many institutional animal care and use committee (IACUC<sup>1</sup>) members strive to review studies involving any vertebrate animal.

For federal agencies, the Interagency Research Animal Committee (IRAC<sup>1</sup>) has published the “IRAC Principles,” which extend AWA coverage to all vertebrates used by federal scientists and to any vertebrate used by any entity when the work is funded by a federal agency (OSTP/IRAC 1985). Because of the extension of coverage by the IRAC Principles, and the policies of the Public Health Service and other agencies and of universities, in practice the lack of legal coverage by the AWA over birds, rats, and mice means only that facilities are not inspected by the Animal and Plant Health Inspection Service (APHIS<sup>1</sup>) and that violations must be addressed by the agency or university directly involved.

Enforcement of the AWA within the USDA is the responsibility of APHIS inspectors who are assigned to the task. Anyone wishing to report a violation of the AWA is directed to report to the USDA. For agencies of the federal government, however, any employee wishing to report a

violation is directed to report to the head of the agency involved. This directive causes an untenable situation because it requires an employee to report a violation to the person who is ultimately his or her supervisor, and who bears the responsibility for the activities being reported.

### **Can We Define “Invasive Procedure,” “Harm,” and “Materially Alter”?**

Contributing to the confusion of whether a field study should be covered by the AWA is the lack of definitions for the terms *invasive procedure*, *harm*, and *materially alter*. The extremes of possible procedures are relatively easy to define. Venipuncture to obtain a blood sample from a wild animal would not be considered by most people to be an invasive procedure, although an inexperienced person with a large-bore needle seeking the jugular or femoral vein has the potential to do considerable damage. Likewise, most people would consider surgically opening the abdominal or thoracic cavity to be an invasive procedure. There is no consensus between these examples as to when a procedure becomes invasive. Similarly, trying to define harm is a subjective process that lacks guidelines.

Materially altering the behavior of the animal is sometimes interpreted to refer to the potential result of performing the research procedure. However, this phrase should be applied to all aspects of a project conducted on free-ranging animals. Capturing an animal certainly materially alters its behavior because it is no longer continuing its normal activities. Virtually any handling of a wild animal results in some level of behavioral change, from rumpling feathers or hair coat that requires additional time for preening or grooming, to physiological changes resulting from stress and fear. The literature is replete with examples of wildlife research capture techniques; however, by comparison, relatively few studies have addressed the results of common procedures such as chemical immobilization, marking and tagging, or disturbances during surveying by airplane, motor vehicle, snow machine, or on foot.

It is not necessary to define invasive procedure, harm, and materially altering the behavior if all projects dealing with free-ranging wildlife are routinely reviewed by an IACUC. IACUC review of all proposed research activities circumvents repetitive discussions of definitions, ensures consistency among government agencies, and assures the public that projects involving free-ranging wildlife receive the same review as projects on captive animals.

Some government agencies have classified activities such as chemical immobilization, capture, physical restraint, phlebotomy, tagging, and banding as not invasive, harmful, or materially altering the behavior of the animal, thereby granting them exemption. However, it is during or after these activities that the greatest mortality or morbidity occurs in wildlife projects (Calvo and Furness 1992; Kenward 2001; Murray and Fuller 2000; Nielsen 1999; Valkenburg 1999; White and Garrott 1990; Withey et al. 2001). Exemptions may be given in an attempt to reduce the work-

load on the agency's IACUC or to make IACUC review of activities more palatable to agency scientists. Such self-proclaimed exemptions have been viewed as incomplete or token compliance of federal and state natural resource agencies with the AWA (Peck and Simmonds 1995). It is particularly important for federal agencies to comply with federal laws enforced by other agencies of the federal government on nonfederal entities such as universities.

The guiding principle for IACUC evaluation of projects involving either captive or free-ranging animals is the same: to ensure that the value of the proposed research is worth the costs borne by the animals involved. The majority of research performed on free-ranging animals is intended to benefit the population rather than the individual animal. It is poor science to extrapolate data gathered on individual animals to a larger population if the handling and processing of the individual animals alter their behavior or physiology from the norm.

Research on free-ranging animals has both similarities and differences from research performed on captive animals. Understanding these similarities and differences is essential to an understanding of how to evaluate research on free-ranging animals.

### **Similarities Between Captive and Free-ranging Animal Research**

Research performed on free-ranging animals is similar to that performed on captive animals in many ways, and IACUCs can use many of the same evaluation principles. Considerations are the same for evaluating the assurances offered by researchers regarding the statistical adequacy, review of existing literature, and lack of needless repetition of the proposed research, with some important exceptions (discussed below). Most of the standards of anesthesia, analgesia, surgery, handling, and restraint can largely be applied in the same way. For example, the scientific literature is replete with examples of surgeries being performed on free-ranging animals using instruments that have been disinfected but not sterilized, often to surgically implant transmitters and data-loggers that themselves have only been disinfected and not sterilized (see Mulcahy 2003, also in this issue, for further discussion). Such techniques would not be tolerated in surgeries performed on captive animals and should not be tolerated in a field setting.

### **Differences Between Captive and Free-ranging Animal Research**

Research with animals can have important differences depending on whether the animals are captive or free-ranging. Among the differences described briefly below are husbandry and nutrition requirements, physical environment, availability, overall focus, statistical methods, and reuse of animals.

Although mice (*Mus*) and rats (*Rattus*), which comprise more than 90% of the captive research animals used by

universities and other institutions, are specifically exempted from coverage by the AWA, many IACUCs still review studies using these animals. Husbandry, nutrition, and other requirements of rodents, dogs, cats, and primates are relatively well known, and the species are available for frequent inspection, restraint, and treatment, if necessary, in captive animal research. In contrast, frequently when wild animals are captured and held for study, their husbandry and nutrition requirements are largely unknown. In such cases, the captive care of these species can become an actual experiment that is as significant as the purpose for which they were captured. Free-ranging animals handled in the wild and released are rarely seen again by the investigator, which makes evaluation of the procedures used problematic.

Perhaps the greatest difference between research performed on free-ranging animals versus laboratory animals is the physical research environment. By definition, free-ranging animals must be captured for most current research to be performed. Protocols established for handling and for invasive procedures in a controlled environment may need to be modified to allow those procedures to be performed in a field situation. For example, regulations require that major surgeries on nonrodent animals must take place in a room dedicated and reserved for that purpose, to ensure the highest degree of asepsis. In fieldwork, it is common for surgeries to be performed on the back of boats, in tents, in cabins, or even in the back seats of trucks and helicopters (e.g., Brown and Luebbert 2002). Biopsies and blood samples are typically taken wherever the animal is captured.

Another important difference is the limited availability of free-ranging animals. Free-ranging animals may be difficult to obtain due to rarity, limited total numbers, sparse populations, presence during only part of the year (e.g., migrating or hibernating animals), or preference for remote or difficult habitats. With traditional research animals such as mice, rats, dogs, cats, horses, cows, and sheep, suitable numbers of animals can be ordered with relative ease. In wildlife studies, fieldwork to capture the animals is a major part of the total project in terms of time, effort, and expense.

Because of the effort, cost, limited availability, and difficulty in capturing sufficient animals, scientists tend to focus on the goals of their project and emphasize completion of the capture and handling of their study animals. IACUCs should require that study plans submitted for review address the subjects of mortality and morbidity during capture and processing. One common method is to include an actual numerical or percentage figure of permitted mortality in the protocol. If this approach is taken, the study plan should detail the steps that will be taken if the stated limit on mortality or morbidity is reached. Options can range from total cessation of activity, to review and modification by an expert panel or by the IACUC, with modifications to be adopted before work can continue. The IACUC should be sensitive to the unique needs of the researcher working in the field and establish a mechanism for responding expeditiously and appropriately to a report or request from the field. In many cases, the attending veterinarian can handle

immediate requests for assistance and review if the entire committee is not available.

In situations involving threatened or endangered species, or in projects that potentially are politically sensitive or controversial, the investigation of a problem with mortality and morbidity during fieldwork should be taken out of the hands of the scientist involved. An independent review and investigation offer the best chance for reducing the controversy that can sometimes result from such events. The IACUC or attending veterinarian should immediately obtain copies of all pertinent field records for submission to the reviewing official or panel. The scientist involved should welcome such a process because it offers protection against accusations of conflict of interest. Because all projects must be reviewed annually, the renewal form submitted by the scientist should include a section for reporting mortality and morbidity experienced in the first year, with a description of how the problem was reported and treated.

Many of the potential problems encountered during capture, restraint, handling, and sampling of free-ranging animals can be avoided with adequate planning, training, and experience of the people involved. However, even the most experienced and skilled scientists experience death or injury of animals during capture and handling. It is unrealistic for an IACUC to expect a zero mortality or morbidity rate during projects involving free-ranging animals. The scientist should anticipate the attention of the IACUC to such matters and should provide documentation for the mortality rate expected for a given procedure in the study plan submitted for review. If a mortality or morbidity rate has not been published for the species or technique involved, the scientist should attempt to predict problems that might be experienced, based on other studies or on other species, and should detail appropriate steps to minimize adverse effects.

IACUCs should realize that projects on free-ranging wildlife often break new ground when dealing with new techniques or new procedures, and members should be generous in understanding the problems involved in such work. IACUCs must accept that with projects involving free-ranging animals, the only way to determine whether a technique will work or to identify the possible adverse effects of a procedure is to go out and do it. Rather than expecting that a scientist can answer all questions about potential adverse effects before doing a study, IACUCs should expect that the scientist will attempt to assess whether and to what degree adverse effects occurred in the study and to address those concerns in future years of a study. Scientists and IACUCs should work together in a good-faith effort to address the problems of morbidity and mortality in future work. Due to the nature of research using free-ranging animals, frequently the only way problems can be solved is by continuing to work on the animals, adjusting procedures as needed.

It is not always possible to rely on statistical methods to determine the number of free-ranging animals needed in experimental groups. Such techniques, which are purely mathematical, do not take into consideration the type of animal being used (e.g., blue whales and rhinoceroses are

very different from white mice and rats). Although the mathematical basis for determining the numbers needed in experimental groups is valid, practical considerations must be applied when using some species of free-ranging wildlife. When the animals are small, exist in high densities, are easily captured and held, and are not rare, it may be possible for an IACUC to insist on statistically determined large numbers to be used in experimental groups. However, for large animals that are difficult to capture and to hold, or those that are rare or even endangered, small numbers may be all that can be practically acquired, and a lower statistical power must be accepted. The alternative might be to do nothing, which is not often possible or even advisable.

Reuse of animals in research that requires invasive or severe techniques is generally not allowed, or is at least severely discouraged, although there may be circumstances in which it is justified (Fentener van Vlissingen 1999). However, in studies on free-ranging wildlife, it is common for animals to be recaptured and reused. For example, as their batteries fail, radio collars may be replaced on wolves (*Canis lupus*) in a pack in an effort to study the movements of the pack for a period longer than the life of a single set of batteries. Studying the long-term survival of individual animals may require the recapture of specific animals and replacement of transmitters.

### **Why Is Implementation of the AWA to Studies on Free-ranging Species an Issue?**

Government researchers working with free-ranging animals are generally fighting to preserve populations of wild animals and the habitats they live in, and they may resent and resist the intrusion of AWA-mandated review of their projects. IACUC review has only recently been introduced to many federal and state agencies, and some researchers view it as unwarranted criticism and an unnecessary additional burden on their professional lives. Because a variety of permits must be obtained (usually requiring submission and review of proposals) to work on free-ranging wildlife, scientists often view IACUC review as a redundant review and approval process.

Although researchers at most universities have had years of experience with IACUCs and accept at least the inevitability of IACUC review of their work, the situation with free-ranging animals is often different. Field researchers are frequently concerned that IACUC members lack sufficient knowledge to evaluate research involving free-ranging animals. Many agency scientists feel, with justification, that they are the world's experts on the free-ranging species with which they work, and that IACUC members are unqualified to judge their work.

Several wildlife-oriented professional societies and others have published guidelines for the use of free-ranging and captive fish, birds, and mammals in research and education (ASIH/AFS/AIFRB 1988; ASIH/THL/SSAR 1987; ASMACUC 1998; DeTolla et al. 1995; Friend et al. 1996;

Gaunt and Oring 1999; Oring et al. 1988). Unfortunately, some of these documents more closely resemble guidelines for limiting the authority and purview of the IACUC than guidelines for the use of animals in research. These guidelines are less rigorous in their descriptions of the expectations and requirements for the capture, immobilization, anesthesia, analgesia, surgery, handling, recovery, and care of animals. All can be used as reference documents for IACUCs reviewing proposals for research on free-ranging animals, but none should be used to limit the function and authority of IACUCs.

When reviewing a proposal involving the application of a new technique, IACUCs sometimes recommend preceding a full-scale field project with a pilot study. This recommendation reflects the reluctance of the IACUC to endorse research utilizing techniques that may have unpredictable effects on the animals involved (e.g., application of a novel technique like a new mode of transmitter attachment). Indeed, a pilot or small-scale study designed to test the suitability of the techniques should be performed when possible; however, in many cases, practical reasons may militate against doing a pilot study. For example, projects dealing with migratory species such as waterfowl or marine mammals may have only one opportunity a year to gain access to their experimental subjects. It is seldom logistically possible for wild animals to be held in captivity for the duration of a pilot study. Bringing wild animals into captivity will rarely create a model of the free-ranging situation.

In most cases, IACUCs should favorably view the development and testing of new techniques on free-ranging animals. The first use and further development of such techniques should be considered as the equivalent of a pilot study. In such cases, the numbers of animals involved can be held to a minimum until the new technique is shown to be acceptable.

### **Who Should Perform Surgeries on Free-ranging Animals?**

Surprisingly, there are no federal laws that govern who should perform surgeries on free-ranging animals. State and local government entities may have laws regarding who can possess drugs, such as anesthetics, and who may perform surgery. Yet the question of who should perform surgeries must be answered with common sense and reason because of the general lack of legal guidance.

The main goals of the surgeon are to ensure the best quality product for the researcher (by minimizing adverse affects that might cause abnormal behavior after release) and to cause the least disturbance to the animal. The advantages of experience in performing surgery cannot be over-emphasized. Surgeons increase their skills by performing many surgeries, even of unrelated types. The researcher who performs only a few surgeries once a year is likely not as skilled as a researcher who performs hundreds of surgeries in a year.

Remembering the goals of the surgeon stated above, it is desirable, albeit not legally required, to concentrate experience in a small number of people who perform many surgeries, rather than to have many people who do a few surgeries each. It is illogical to expect that a high level of surgical skill can be transferred to a new surgeon by demonstrating a given procedure a couple of times, and then having the new surgeon perform the surgery a few times. When IACUC members review proposals involving surgeries on free-ranging animals, they should expect to see documentation about who will be performing the surgeries and their experience level (including unrelated surgeries).

## The “Special” Case of Fish

The enacting regulations for the AWA and its amendments have specifically exempted poikilothermic animals from coverage. However, a worldwide wave of concern for animal welfare makes the eventual coverage of poikilotherms inevitable. Many state agencies and universities have included poikilothermic animals within their own institutional requirements for compliance with the AWA, and proposals involving fish are routinely reviewed at those institutions. For agencies of the US government, coverage of the AWA to all vertebrates was extended by the IRAC Principles (OSTP/IRAC 1985).

Whereas veterinarians perform most invasive surgeries on free-ranging mammals and birds, the case is different for most surgeries performed on fish. The majority of surgeries performed on fish are to implant transmitters into the coelom, and the researchers are the surgeons (see Mulcahy 2003, for further discussion). Despite a panoply of documented complications following the implantation of devices into fish, the techniques used for surgery are frequently those that would be questioned if used on any other species. For example, surgeries are typically performed in the field without using aseptic technique (without wearing sterile gloves, and implanting transmitters and surgical instruments that are disinfected, rather than sterilized).

When IACUC members review proposals involving surgery on fish, they should insist on the same level of preparation and asepsis that they expect with studies on higher level animals. Where exceptions to the basic standards of procedure are made, researchers should present documentation that such deviations are required. For example, researchers do not chemically disinfect surgical sites on fish because they believe it causes damage, despite evidence that povidone-iodine disinfectant does not adversely affect healing (Wagner et al. 1999).

## Scientists, IACUC Veterinarians, and Wildlife Veterinarians

IACUCs bear a special responsibility in reviewing projects that involve free-ranging animals. The attitudes of the mem-

bers of an IACUC will be reflected in the attitudes of scientists toward the review of their projects. Because of the range of species, habitats, and working environments in studies of free-ranging animals, IACUC members will be challenged to make their reviews knowledgeable, sufficient, and pertinent.

Most fish and wildlife biologists learn their techniques from other biologists. Turnover of biologists in government agencies and at universities is usually low due to the relatively small number and high desirability of such positions. The result is a limited input of new ideas; and once introduced, techniques tend to vary little over time. In addition, very few veterinarians are employed by federal and state natural resource agencies, and even fewer by university departments of fisheries or wildlife biology. The absence of daily contact between wildlife veterinarians and biologists means that medical and surgical advice is often severely limited. Due to the absence of wildlife veterinarians from fisheries and wildlife departments, the veterinarian most known by biologists is the one who serves on the IACUC, who reviews and evaluates proposals put forth by the biologists. An authoritarian or sometimes adversarial relationship between the IACUC veterinarian and the researchers discourages a more synergistic relationship between the two professions.

IACUC veterinarians and other IACUC members must recognize the limits of their knowledge about free-ranging species. They should consult with biologists and wildlife veterinarians as needed to acquire the appropriate information. IACUC members can, however, judge many of the mechanical aspects of work performed on free-ranging animals by using the same principles that apply to similar efforts on captive animals. They should have an open mind and be willing to be convinced by good-faith arguments presented by wildlife researchers. Similarly, wildlife researchers must be willing to acknowledge and accept the input offered in good faith by IACUCs.

The extra workload that IACUC review imposes can be reduced by some simple stratagems. Wildlife researchers tend to specialize in working on certain groups of animals, and they frequently use the same techniques repeatedly. When submitting proposals for IACUC review, scientists can greatly reduce their efforts by developing standard protocols for repeated activities like the following: capturing, restraint or chemical immobilization, handling and measuring, sampling (e.g., blood, and hair or feathers), and banding or tagging. Standard protocols that have been reviewed and approved by an IACUC can be attached later for reference in subsequent, new proposals.

Currently, animal welfare concerns (or, more accurately, concern about criticism by animal rights activists) and drug regulations (for both controlled and noncontrolled substances) are driving the employment of wildlife veterinarians as much as their traditionally perceived roles as immobilizers of animals and surveyors of diseases. Wildlife veterinary medicine is expanding its function in wildlife biology due to the increasing complexity of research on

wild animals, including surgeries in field situations, and to the emerging field of conservation medicine (Aguirre et al. 2002; Daszak et al. 2000; Deem et al. 2001; Glosser 1993; Hutchins et al. 1993; Lafferty and Gerber 2002; Mainka 2001; Meffe 1999; Osofsky et al. 2000; VanLeeuwen et al. 1998). Emerging diseases, and particularly zoonotic diseases (e.g., West Nile virus, tuberculosis, and spongiform encephalopathies), are increasing in number and in importance in the public mind, which will increase the roles played by wildlife veterinarians (Dobson and Foutopoulos 2001; Fayer 2000; Friend et al. 2001; Harvell et al. 2002; McLean et al. 2001; Rappole et al. 2000; Williams and Young 1992; Williams et al. 2002). Wildlife veterinarians are becoming better trained and qualified, gaining scientific credentials through traditional Ph.D. programs and/or board certification by the American College of Zoological Medicine and other specialty colleges. These well-qualified veterinarians help to increase the level of technical expertise on projects. Their specialty training and knowledge offer employers a mechanism for ensuring the quality and ability of veterinarians to handle the new challenges of wildlife health research. For these reasons, qualified wildlife veterinarians are important resources and valuable participants in IACUCs reviewing wildlife projects.

## Conclusion

The AWA and IRAC Principles clearly cover research performed on free-ranging animals, and such research should therefore receive the same review by an IACUC as research on captive animals. Similarities and differences exist between research performed on free-ranging animals, especially in field settings, and research on captive animals. IACUCs face special challenges in reviewing wild animal research and should work closely with scientists and wildlife veterinarians to resolve uncertainties about such research. The ultimate goals of IACUC review of research on free-ranging animals are to ensure that the value of such research is worth the use of the animals involved, and to ensure that the conclusions drawn from the animals used in the research are suitable for extrapolation to the overall population of the species.

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