



Field Euthanasia Methods for Wildlife

Tracy Thompson, DVM
National Park Service

OLAW Online Seminar
March 29, 2018



Objectives

- Review euthanasia and humane killing methods
- Consider regulatory requirements and professional society guidance regarding these methods
- Discuss challenges and conditions for performing euthanasia in the field
- Examine the IACUC's role and responsibility for ensuring appropriate methods and training for field euthanasia



Euthanasia

Euth + thanatos = good death

- “*Euthanasia* is the act of humanely killing animals by methods that induce rapid unconsciousness and death without pain or distress.”
- Unless a deviation is justified for scientific or medical reasons, methods should be consistent with the *AVMA Guidelines for the Euthanasia of Animals*.¹



¹From: The Guide for the Care and Use of Laboratory Animals 2013, 8th Ed.;
Veterinary Care: Euthanasia, p. 124

American Veterinary Medical Association (AVMA)

- “...ending the life of an individual animal in a way that minimizes or eliminates pain and distress.”
- “A good death is tantamount to the humane termination of an animal’s life.”²
- “...recognizing an inherent lack of control over free-ranging wildlife,
- accepting that firearms may be the most appropriate approach to their euthanasia,
- acknowledging that the quickest and most humane means of terminating the life of free-ranging wildlife in a given situation may not always meet all criteria established for euthanasia (i.e., distinguishes between euthanasia and methods that are more accurately characterized as humane killing).”³



² The AVMA Guidelines for the Euthanasia of Animals: 2013 Edition; Section I3, p. 6

³ The AVMA Guidelines for the Euthanasia of Animals: 2013 Edition; S7.6.1, p. 81

Humane Killing

Euthanasia versus humane killing (per AVMA)

- Methods of killing other than those deemed “acceptable methods of euthanasia” might be justified in situations with free-ranging wild animals.
- Quickest and most humane means of terminating the life of free-ranging wildlife in a given situation may not always meet all criteria established for euthanasia.
- Gunshot cannot be considered euthanasia in wildlife unless bullet placement is to the head.



²The AVMA Guidelines for the Euthanasia of Animals: 2013 Edition; S7.6.1, p81.

Regulations and Guidelines

Regulatory

- USDA
 - Animal Welfare Act Regulations
 - [Animal Care Policy #3 Veterinary Care](#)



Funding and Oversight Agencies

- [OLAW/NSF](#)



National Institutes of Health
Office of Laboratory Animal Welfare

- AAALAC, International



Taxa and Professional Societies

- [American Society of Mammalogists](#)
- [Ornithological Council](#)
- [American Fisheries Society](#)
- [American Society of Ichthyologists and Herpetologists](#)

- [Canadian Council on Animal Care](#)
- [National Center for the 3R's](#)

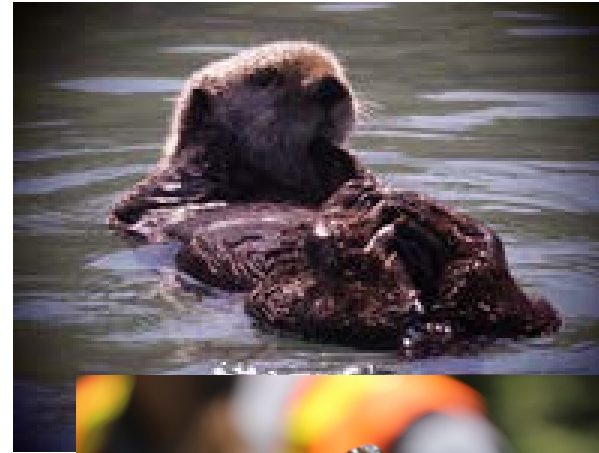


Photo credit: NPS Gallery



PHS Policy and OLAW Guidance

- The PHS Policy states that “methods of euthanasia used will be consistent with the recommendations of the [American Veterinary Medical Association \(AVMA\) Panel on Euthanasia](#)* unless a deviation is justified for scientific reasons in writing by the investigator.”
- The IACUC is responsible for oversight of live vertebrate animal activities including field euthanasia of wildlife. The IACUC must ensure that proposed studies are in accord with the *Guide* where applicable and that methods of humane killing approved by the IACUC are case specific and the exception to using methods in the AVMA Guidelines noted as acceptable or acceptable with conditions.

* AVMA Guidelines for the Euthanasia of Animals: 2013 Edition

Need for Euthanasia or Humane Killing

- Goal of study (voucher collection, diagnostics)
- Contingency
 - Type, extent, and severity of injury
 - Physical condition of the injured animal
 - Ability to survive
 - Species status (Threatened & Endangered)
 - Is the injury human caused?



Factors to Consider When Choosing a Method

- SAFETY
- Degree of animal restraint
- Skill of personnel
- Availability of drugs and equipment
- Reliability of the technique
- Aesthetic acceptance
- Disposition of the carcass
- Need for diagnostic samples



Euthanasia Methods

Chemical

- Injectable
- Inhalant
- Immersion
- Topical (amphibians)

Physical

- Gunshot: Head shots
- Penetrating captive bolt
- Cervical dislocation
- Decapitation (+/- pithing)



Field Limitations

Chemical

- Safety
- Qualifications
- Legal provisions
 - Veterinary prescription
 - State Veterinary Practice Act
 - Veterinary Mobility Act
 - DEA licensure of PI
- Environmental impact
 - Weather
 - Terrain
 - Disposition questions
- Distress
 - Injuries or fatalities before anesthesia or euthanasia can be administered
 - Capture myopathy
 - Injuries

Physical

- Safety
- Qualifications
- Humaneness and impact on personnel
- Environmental impact
 - Disposition questions
 - Lead



Special Field Considerations

- Marine species
 - Chemical methods
 - Physical methods
 - Public and personnel safety and impact
- Permits
- Disposal



Photo credit: Craig Harms



Special Field Considerations

- Venomous
- Hibernating
- Fossorial
- Food for humans or animals



Photo credit: Chris Parkinson



Injectable Agents

- Barbiturates (Euthasol, Sleepaway)
 - Pentobarbital + phenytoin sodium
 - IV, IC or IP
- Anesthetic agents



- MUST remove carcass from the environment because of secondary toxicity
 - Bury deeply, landfill
 - Incinerate



Inhalants

- Gas anesthetics
 - Isoflurane
 - Vaporizer
 - Container/cotton ball method (< 7 kg)

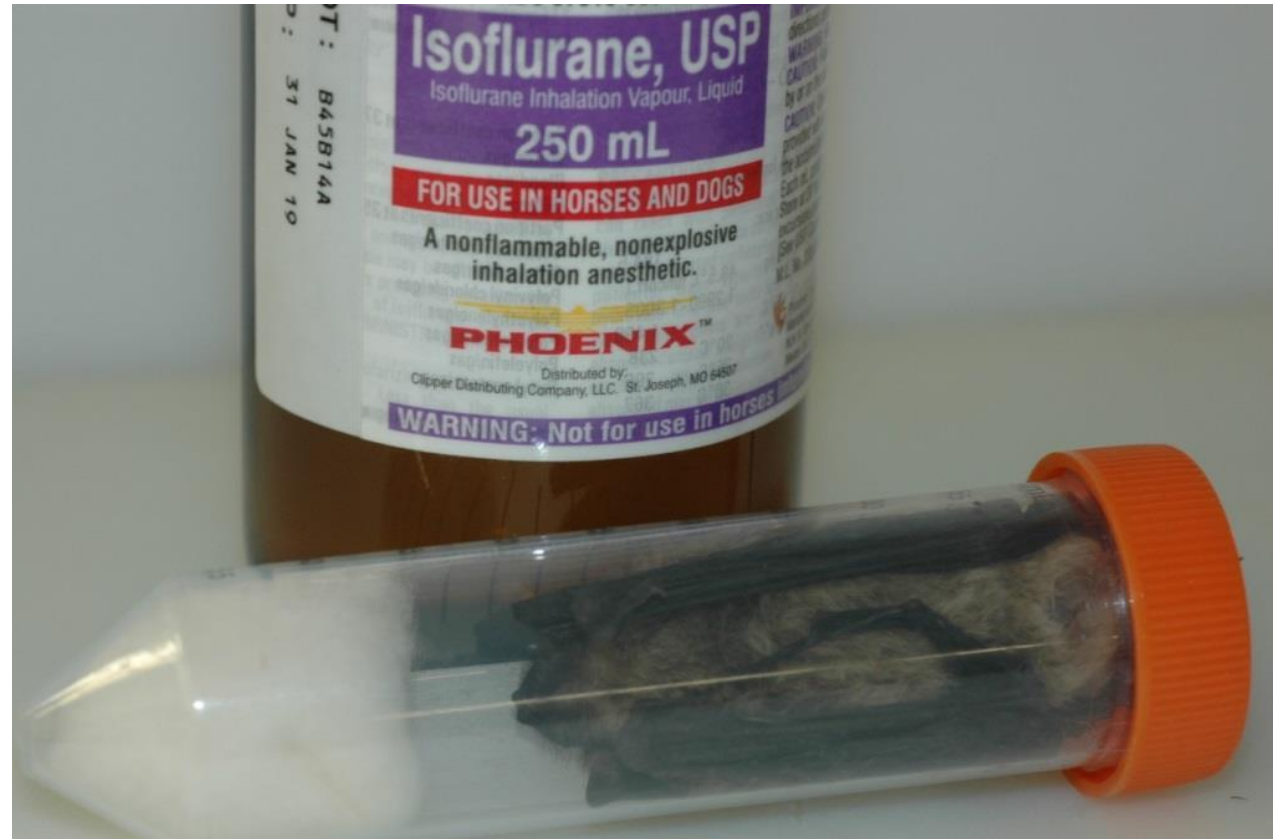
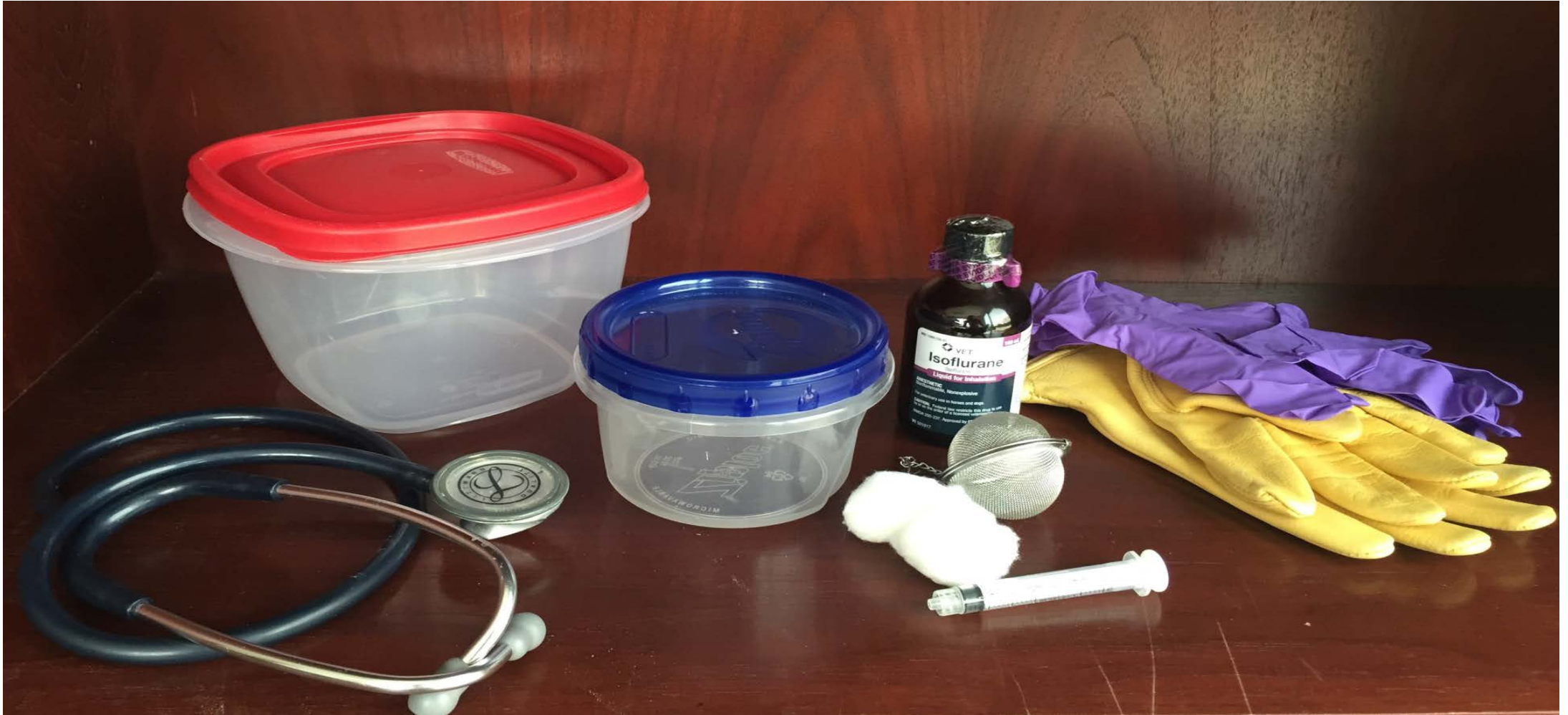


Photo credit: Anne Ballman, USGS



Isoflurane Field Euthanasia Set-up



Step 1: Charge the Chamber



Step 2: Add Animal



Step 3: Monitor



Step 4: Verify Death

Apply secondary physical method (e.g. decapitation, cervical dislocation)



All photos and “bat” courtesy of Dr. Michelle Verant, NPS.

Inhalants

Gas anesthetics

- Carbon dioxide (compressed CO₂)
 - Not usually compatible for taking into the field
 - Modifications possible?
 - More acceptable than other methods?



Photo credit: theodora.com

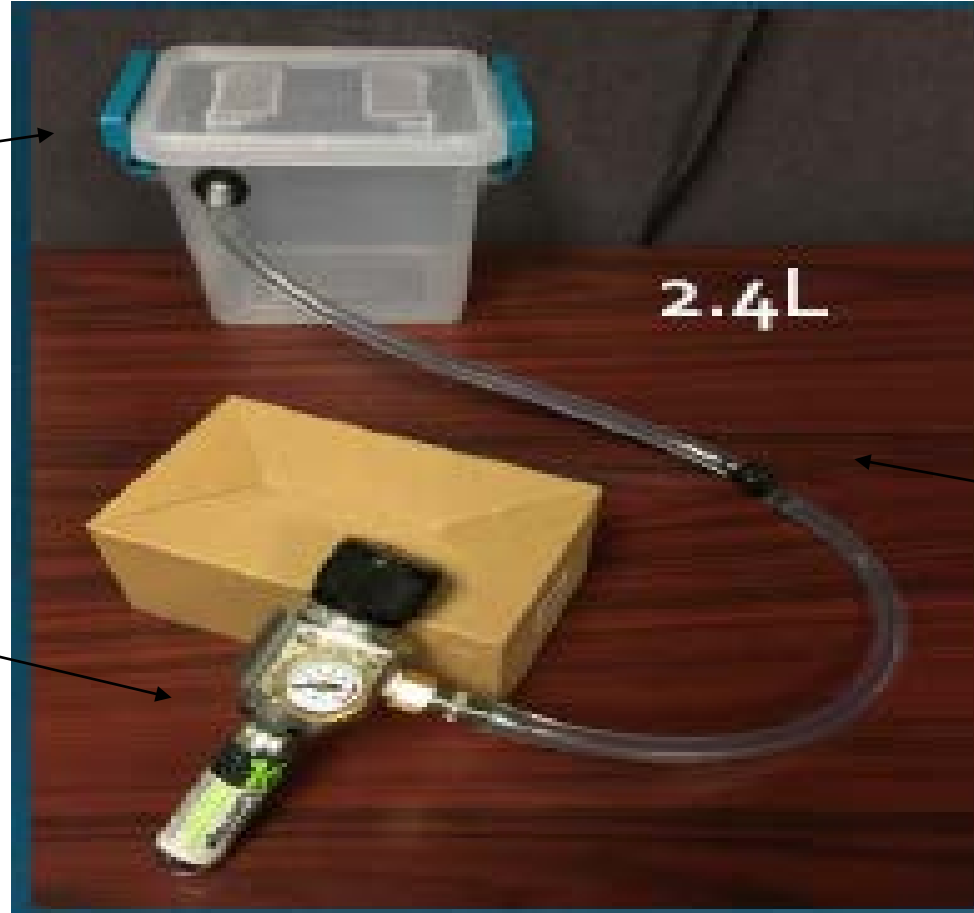


Field CO₂ Chamber

Apply secondary physical method (e.g. decapitation, cervical dislocation)

System calibrated for volume of animal holding chamber

Mini regulator controls flow of CO₂ from cylinder



Flow Rate = 10-30% volume displacement per minute

Micro-ball valve further restricts gas flow to achieve desired rate



Development of a compact system for field euthanasia of small mammals; Murray V. Ellis, Journal of Mammalogy, 98(4):1211–1214, 2017

Components For Field CO₂ Unit



Immersion and Topical

Fish and amphibians

- Buffered Tricaine methane sulfonate (MS-222)
- AQUI-S[®] (eugenol)
- 20% benzocaine (Oragel™) rubbed on abdomen
- Followed by physical method to ensure death



Physical Methods

- Gunshot
- Cervical Dislocation
- Penetrating Captive Bolt
- Decapitation

Controversial methods⁵:

- Thoracic or Cardiac Compression
- Pit Fall Traps
- Kill Traps



Photo credit: Bunny Rancher

⁵The AVMA Guidelines for the Euthanasia of Animals: 2013 Edition; M3.9 Kill Traps, p40; M3.12 Thoracic (Cardiopulmonary, Cardiac) Compression, p.41.

Gunshot Considerations

Avoid doing in view of public

Gunshot to head:

- May not always be possible or the best option
 - Interferes in diagnostic sampling
 - Destroys anatomical structures
 - Poses risk for exposure to disease
 - DO NOT USE IF ANIMAL SHOWING NEUROLOGIC SIGNS

Gunshot other than to head:

- Proximity to animal or dangerous to approach
 - Remember goal of eliminating suffering
 - May be most humane choice
- Not euthanasia
 - May experience pain and distress with method
 - Make every effort to limit duration and extent



Disposition

- Carcasses are not fit for human consumption if the animal received any drugs.
- Lead ammunition and some chemicals used in animals should not be left in the environment due to risks to scavenger animals
- Use of dead animals
 - On landscape
 - Museum
 - Laboratory



Ethical Considerations

American Veterinary Medical Association (AVMA)

- Research objectives may limit the use of some euthanasia agents or methods for wildlife species.
- [IACUC] ensures...the method chosen minimizes pain and distress, ensures a respectful death to the animal.
- [method]brings about termination of life as quickly, efficiently, and humanely as possible.
- ...[IACUC]must apply the principles of refinement, replacement, and reduction, and ensure a respectful death for research animals. ⁶



⁶The AVMA Guidelines for the Euthanasia of Animals: 2013 Edition; 14 Euthanasia and Veterinary Medical Ethics, Page 9

IACUC Role and Responsibility

- Euthanasia methods
- Preparedness
- Training
 - Proficiency in method
 - Knowledge of species
 - Handling/restraint and behavior effects
 - Minimizing pain/distress
 - Understanding mechanism to produce humane death
 - Equipment and supplies needed
 - Refresher training
 - Refinements



Summary

- Review euthanasia methods commonly used for wildlife in field research activities
- Consider regulatory requirements and professional society guidance regarding these methods
- Discuss challenges and conditions for performing euthanasia in the field
- Examine the IACUC's role and responsibility for ensuring appropriate methods and training for field euthanasia



Questions?



Question 1

When euthanasia might be required for animals that are not the target species (accidental trapping, injury), does the IACUC need to review the methods for euthanasia for these cases as well?

Question 2

What are some of the common euthanasia methods employed for stranded marine mammals?

Question 3

Do wild rodent species react the same way to carbon dioxide as laboratory rodents? There might be some species such as moles that can survive hypoxia for long periods of time.

Question 4

Can the field CO₂ chamber maintain a 10-30% flow rate as required by the AVMA guidelines?

Question 5

Can you address how field study investigators should plan for having veterinary oversight for dealing with clinical illnesses, adverse events, etc. – when the studies are far from the institution and institutional veterinarians?

Questions?





OLAW Online Seminars

June 28th 2018
Facility Inspections

Dawn O'Connor, LVT, CPIA
University of Michigan

2018 ICARE Training	2018 Dates	Location
ICARE Academy (2 day)	May 8-9	Newport Beach, CA
ICARE Academy (3 day)	June 18-20	Chicago, IL
ICARE Academy (2 day)	September 12-13	Denver, CO

Information and registration available through the OLAW website or at https://grants.nih.gov/grants/olaw/interagency_icare.htm or directly from Susan Silk at silks@nih.gov and 301-402-4371



Interagency Collaborative Animal Research Education