

Challenges in Museum Collection of Birds for Biodiversity Inventories



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UC DAVIS
WILDLIFE, FISH AND
CONSERVATION BIOLOGY



Purpose of Collections in Biodiversity Research

Voucher Specimens required to document species, particularly in areas where surveys have not been undertaken

Renaissance in Use of Museum Specimens

- **Discovery of new species**
- **Evolutionary questions**
- **Environmental research**
- **Taxonomy and systematics**
- **Repository of genomic materials**
- **Specimens across space and time**
- **Human-bird interactions**

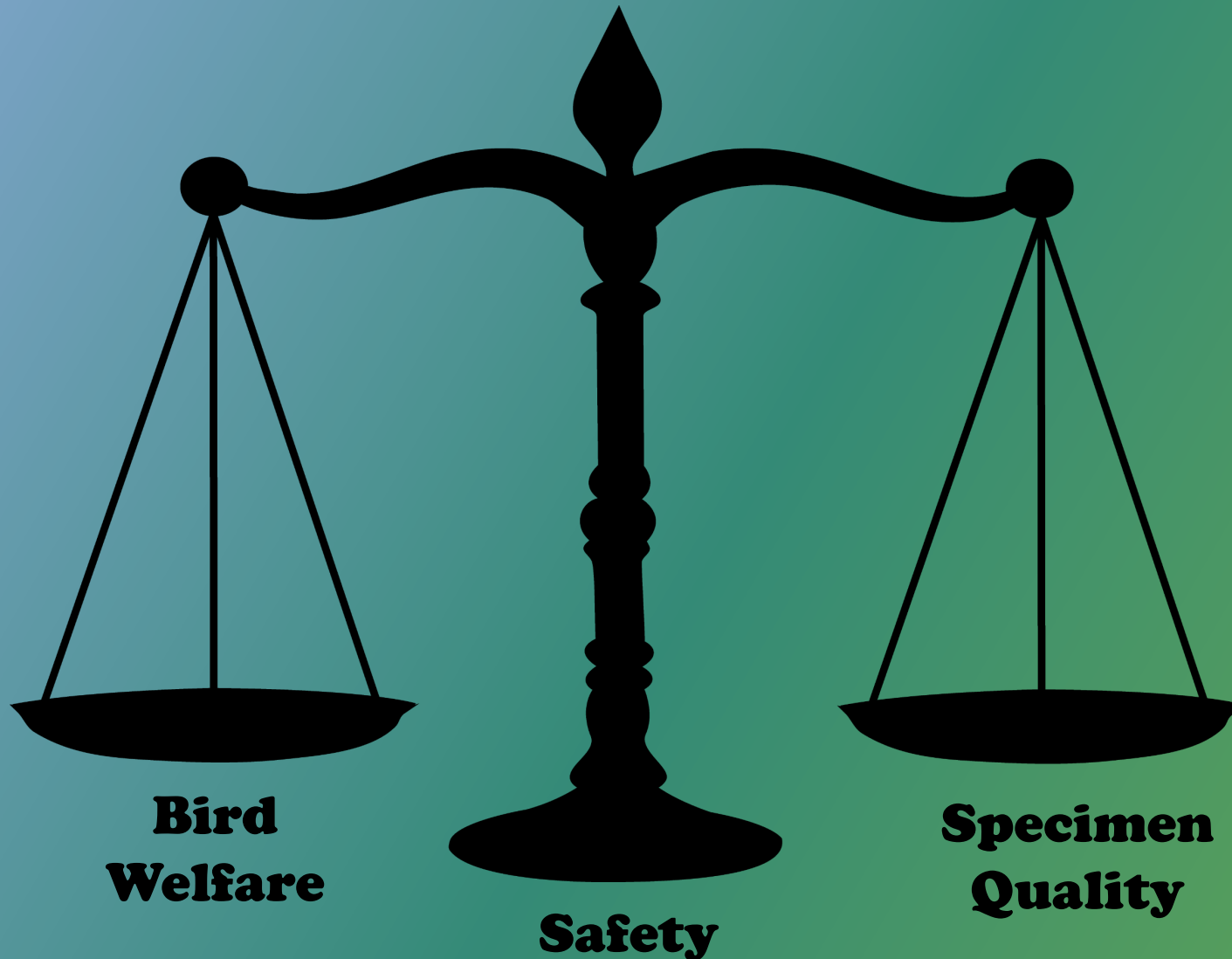


The Extended Specimen, Studies in Avian Biology, Webster (ed.) 2018

Ornithologists working in the field are faced with many challenges in ensuring that their research is conducted both safely and ethically.



Balancing Concerns and Needs



- **IACUC Approval**
- **Permits**
- **Safety Training**
- **Field Plan**
- **Disaster Planning**
- **Care of Specimens**

Challenges During the IACUC Approval Process

- **Impart a clear understanding field work challenges**
- **Develop contingencies when things go wrong**
- **Clearly define need of alternate euthanasia method**



Challenge: Many euthanasia methods poorly studied. AVMA guidelines at times have not yet incorporated recent research findings

Challenges in specific training for Museum field studies

- **Animal Care 101 (IACUC Approved Program)**
- **Develop Specific Illness and Injury Prevention Program (IIPP)**
- **If firearms involved - accredited firearms or hunter safety training**
- **Training anesthetics or chemical agents use**
- **Training in manual methods of euthanasia**



Optimal Situations for Collecting a bird

**Lethal Exposure
Isoflurane**



Mist Net



High Quality Specimen



Methods of Take: Firearms



Clean Kill



Injured Bird

**What are our choices to quickly
Dispatch an injured bird?**



Lethal Take with Gun:

Injured bird when chemicals are not available

- **Considerations: Safety of Researcher Paramount – Operating a firearm not safe in presence of chemical agents.**
- **Goal of researcher is to capture injured bird and euthanize quickly to reduce stress and pain**
- **Shoot Bird a second time – effective but not always practical**
- **Must rely on other manual methods**



Some approved manual methods of euthanasia cannot be used to secure a quality specimen.

Any that can result in decapitation or other gross damage to the specimens must be avoided.

If an animal is to be sacrificed for museums, we must recognize a responsibility to obtain the highest quality specimen.



Remote Biodiversity Research

Collecting when chemicals and firearms are prohibited

Carrying lethal chemicals or agents into remote areas is not realistic and can be unsafe or forbidden. Mist nets generally are used to capture birds. Researchers need quick methods for humane killing that yield quality specimens. Methods are limited in these situations.



Rapid Cardiac Compression (RCC) (Thoracic Compression)

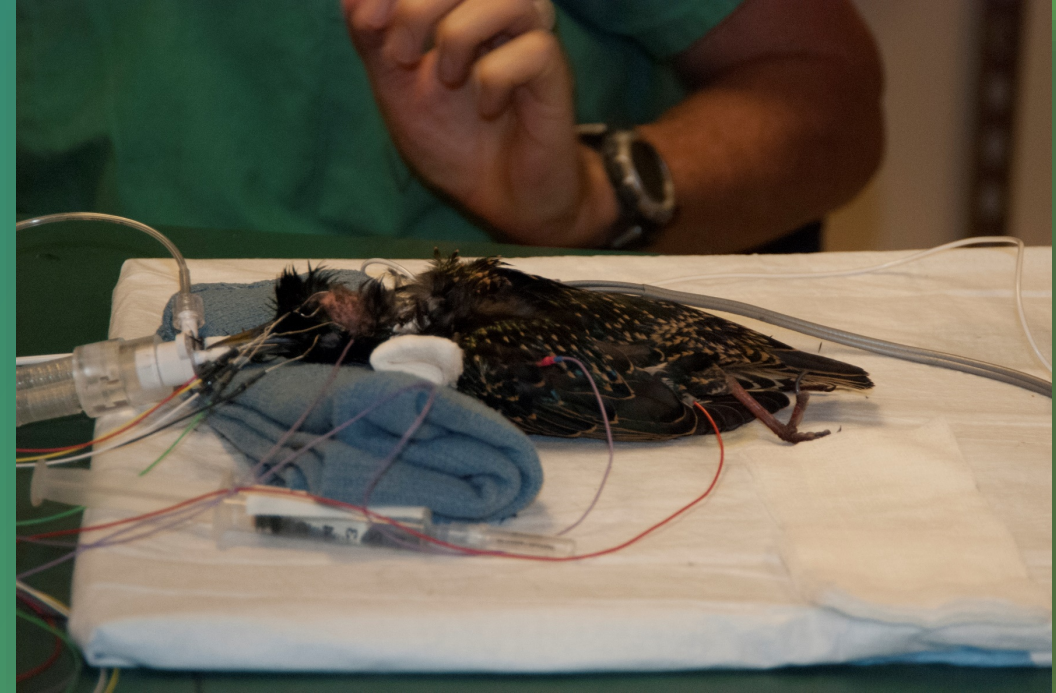
- **Currently not approved by AVMA**
- **Understanding of method is not correct in AVMA guidelines**
- **Method has been used effectively for decades**
- **Clinical Studies in 2014 and findings published in 2017. *Murphy et al 2017***
- **Methods developed and published in 2018. *Engilis et al 2018***



Rapid Cardiac Compression (RCC) (Thoracic Compression)

- **Thoracic compression denotes suffocation -- not correct. It is due to loss of circulatory blood volume to vital organs such as the brain and causes rapid loss of consciousness and death.**
- **Time to cessation of pulse was significantly shorter in RCC (15-30 secs) vs Pentobarbital (8-301) sec.**
- **There was no significant difference in the time to isoelectric EEG when both methods were compared.**

Murphy et al 2017



Meeting Challenges

- **Mutual understanding by researchers and IACUC members during approval process;**
- **Clearly defining the euthanasia methods and need, clearly elaborate challenges;**
- **and above all, training.**



Thank you