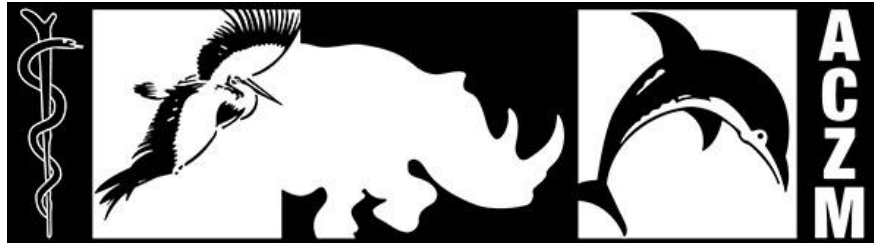


American College of Zoological Medicine



Qualifying Examination

Job Task Analysis Report 2024

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Executive Summary

Beginning in June 2022, the American College of Zoological Medicine (ACZM) conducted a Job Task Analysis study to define the role of an ACZM board-certified specialist in zoological medicine. The ACZM worked with Veterinary Specialty Exams, LLC (VSE) to develop and conduct the Job Task Analysis study that would describe the knowledge requirements of competent ACZM diplomates. Results of the Job Task Analysis study provide the basis for making a valid claim of appropriate test score inference.

The ACZM appointed a committee of subject matter experts (SMEs) to provide content expertise. The committee consisted of 8 members with diverse specializations, areas of employment and geographic locations. The committee spent considerable time discussing the knowledge and skills required of a day-one ready Diplomat. Through this process, the committee created updated content outlines for the five sections represented on the Qualifying examination.

The new content outlines were used to develop online surveys. The surveys contained multiple scales to rate each task required of board-certified specialists in Zoological Medicine. The ACZM also included several demographic questions to gather confidential data describing the survey respondents. VSE administered the survey instrument using the Qualtrics XM[®] platform.

An email invitation to take the survey was sent to 288 ACZM Diplomates. 105 individuals completed one or more of the Qualifying Examination surveys, for a response rate of 36%. Approximately 99% of respondents indicated that the survey completely or adequately covered the important knowledge areas required to be an ACZM Diplomat.

VSE conducted a follow-up webinar, using Zoom web conferencing, to review the initial survey results and all comments from the respondents. The goal of this meeting was to establish exclusion criteria to differentiate between the important and unimportant tasks, based on respondents' ratings. The committee finalized the list of tasks and established domain weights, which will serve as the new blueprints for the examination. Adoption of the content outlines and the examination blueprints establishes the link between the knowledge necessary to become a board-certified specialist in zoological medicine and successful performance on the qualifying examination.

Introduction

Survey Overview: The Content Validation Model

The foundation of a valid, reliable, and legally defensible professional certification program is a well-constructed Job Task Analysis study. The Job Task Analysis study establishes the link between test scores achieved on certification exams and the competencies being tested. Therefore, pass or fail decisions correlate to competent performance. When evidence of validity based on examination content is presented for a specific professional role, it is critical to consider the relative importance of the competencies being tested. *The Joint Standards for Educational and Psychological Testing (AERA, APA, and NCME, 2014)* state:

Standard 14.10

When evidence of validity on test content is presented, the rationale for defining and describing a specific job content domain in a particular way (e.g., elements, knowledge, skills, abilities or other personal characteristics) should be stated clearly.

Standard 14.14

The content domain to be covered by a credentialing test should be defined clearly and justified in terms of importance of the content for the credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted.

Purpose of the Job Task Analysis Study

The American College of Zoological Medicine (ACZM) worked with Veterinary Specialty Exams, LLC (VSE) to develop a qualifying examination to meet the above-mentioned standards. A Job Task Analysis study was conducted, beginning in June 2022, which included developing a survey that described the requirements for a competent ACZM board-certified specialist in the health and welfare of zoological species. Based on the Job Task Analysis, ACZM determined the content for its qualifying examination.

This report provides an overview of the survey design, analysis, and results. Survey results of demographic data are also displayed. In addition, the implications of these results on examination development are discussed.

ACZM Qualifying Examination Content Outline - Aquatics

- I. Clinically relevant biology
 - A. Understand clinically significant differences among species
 - i. Anatomical
 - ii. Physiological
 - iii. Ecological
 - B. Recognize taxonomy and phylogeny
 - C. Understand appropriate/natural behaviors and social structures
- II. Environmental factors
 - A. Recognize potential hazards and understand differential effects across taxonomic groups
 - i. Biological
 - ii. Chemical
 - iii. Physical
 - B. Understand taxon-specific environmental management relative to clinically relevant ecology
 - i. Understand environmental conditions in relation to animal health and welfare in both field and managed environments
 - ii. Evaluate husbandry and life support systems
 - 1. Water quality (including filtration systems)
 - 2. Air quality (including ventilation systems)
 - iii. Understand principles of sanitation and disinfection
 - C. Understand principles of epidemiology
 - i. Disease surveillance
 - ii. Risk analysis
- III. Preventive Medicine and Wellness
 - A. Understand principles of nutrition
 - i. Dietary requirements and formulation
 - ii. Food handling, storage and safety
 - B. Understand behavior and welfare management
 - i. Five Freedoms and Five Domains
 - ii. Species-specific natural behaviors
 - iii. Inappropriate behaviors
 - iv. Environmental enrichment
 - v. Behavioral training
 - vi. Objective criteria for welfare assessment

- C. Evaluate pest control programs
 - D. Evaluate preventive medicine/wellness programs
 - i. Biosecurity
 - ii. Health examination
 - iii. Vaccination
 - iv. Parasite management
 - v. Quarantine
 - vi. Life stage- and taxon-specific strategies
 - vii. Animal acquisitions and dispositions
 - viii. Population and reproductive management
 - E. Evaluate end of life care
 - i. Objective criteria for euthanasia decisions
 - ii. Species-appropriate euthanasia techniques
- IV. Restraint
- A. Understand appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
 - B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
 - i. Mechanisms of action
 - ii. Administration and routes
 - iii. Clinical pharmacokinetics
 - iv. Clinical pharmacodynamics and potential adverse effects
 - C. Recognize the safety implications for humans, non-target species, and the environment
 - D. Understand appropriate use of capture, immobilization, and anesthetic monitoring equipment
 - E. Recognize patient risks involved with capture and anesthesia
 - F. Understand the principles of monitoring during restraint
 - i. Clinical applications
 - ii. Interpretation
 - iii. Intervention
 - G. Understand principles of safe animal transport
- V. Medicine and Surgery
- A. Evaluate case history
 - B. Recognize expected physical examination findings and abnormalities
 - C. Understand the principles, collection, applications and limitations of antemortem diagnostic testing (on individual and population level)

- i. Clinical and anatomic pathology (including serology and molecular testing)
- ii. Diagnostic imaging
- iii. Microbiology
- iv. Toxicology
- v. Other modalities
- D. Evaluate case management
 - i. Understand the pathophysiology of diseases and recognize differential diagnoses
 - ii. Understand appropriate non-surgical therapies
 - 1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
 - 2. Complementary and alternative therapies (e.g., physical therapy, acupuncture, laser, hyperbaric)
 - 3. Adverse and unintended effects
 - 4. Hospitalization, individual and population/habitat management
 - iii. Understand principles, application and appropriateness of surgery
 - 1. Soft tissue, orthopedic and orodental procedures
 - 1. Endoscopy and minimally invasive techniques
 - 2. Risk and outcome assessment

VI. Mortality and Crisis Management

- A. Mortality events and post-mortem analysis
 - i. Recognize normal and abnormal gross necropsy findings
 - ii. Select appropriate postmortem samples
 - iii. Interpret important histopathologic findings
 - iv. Understand morbidity and mortality reviews
- B. Understand management strategies for crisis situations
 - i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications, evacuation plans)
 - ii. Communication and reporting structure (e.g., incident command)

VII. Conservation and One Health

- A. Understand principles/terms of One Health
 - i. Host range shift (e.g., spillover)
 - ii. Population declines or shifts
 - iii. Hazards of exposure to non-target animals, humans, and environment
 - iv. Antimicrobial stewardship
- B. Understand the epidemiological triad and disease emergence
 - i. Environment

1. Climate change
 2. Land use change and encroachment
 3. Resource management (energy, water, waste)
 4. Toxicology
 5. Pollution and environmental degradation (e.g., oil spills, air quality)
- ii. Animal
1. Inter-species disease transmission
 2. Unusual mortality events
 3. Animals as sentinels
- iii. Human
1. Food safety, drug residue and withdrawal times
 2. Public health
 3. Zoonoses
 4. Wildlife human interface, physical dangers, escape protocols

ACZM Qualifying Examination Content Outline - Avian

- I. Clinically relevant biology
 - A. Understand clinically significant differences among species
 - i. Anatomical
 - ii. Physiological
 - iii. Ecological
 - B. Recognize taxonomy and phylogeny
 - C. Understand appropriate/natural behaviors and social structures
- II. Environmental factors
 - A. Recognize potential hazards and understand differential effects across taxonomic groups
 - i. Biological
 - ii. Chemical
 - iii. Physical
 - B. Understand taxon-specific environmental management relative to clinically relevant ecology
 - i. Understand environmental conditions in relation to animal health and welfare in both field and managed environments.
 - ii. Evaluate husbandry and life support systems (e.g., enclosures, water, ventilation, heating, humidity, lighting, substrate)
 - iii. Understand principles of sanitation and disinfection
 - C. Understand principles of epidemiology
 - i. Disease surveillance
 - ii. Risk analysis
- III. Preventive Medicine and Wellness
 - A. Understand principles of nutrition
 - i. Dietary requirements, formulation and delivery
 - ii. Food handling, storage and safety
 - B. Understand behavior and welfare management
 - i. Five Freedoms and Five Domains
 - ii. Species-specific natural behaviors
 - iii. Inappropriate behaviors
 - iv. Environmental enrichment
 - v. Behavioral training
 - vi. Objective criteria for welfare assessment
 - C. Evaluate pest control programs

- D. Evaluate preventive medicine/wellness programs
 - i. Biosecurity
 - ii. Health examination
 - iii. Vaccination
 - iv. Parasite management
 - v. Quarantine
 - vi. Life stage- and taxon-specific strategies
 - vii. Animal acquisitions and dispositions
 - viii. Population and reproductive management
- E. Evaluate end of life care
 - i. Objective criteria for euthanasia decisions
 - ii. Species-appropriate euthanasia techniques

IV. Restraint

- A. Understand appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
- B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
 - i. Mechanisms of action
 - ii. Administration and routes
 - iii. Clinical pharmacokinetics
 - iv. Clinical pharmacodynamics and potential adverse effects
- C. Recognize the safety implications for humans, non-target species, and the environment
- D. Understand appropriate use and clinical applications of capture, immobilization, and anesthetic monitoring equipment
- E. Recognize patient risks involved with capture and anesthesia
- F. Understand the principles of monitoring during restraint
 - i. Validation
 - ii. Interpretation
 - iii. Intervention
- G. Understand principles of safe animal transport

V. Medicine and Surgery

- A. Evaluate case history
- B. Recognize expected physical examination findings and abnormalities
- C. Understand the principles, collection, applications and limitations of antemortem diagnostic testing (on individual and population level)
 - i. Clinical and anatomic pathology (including serology and molecular testing)

- i. Diagnostic imaging
- ii. Microbiology
- iii. Toxicology
- iv. Other modalities

D. Evaluate case management

- i. Understand the pathophysiology of diseases and recognize differential diagnoses
- ii. Understand appropriate non-surgical therapies
 - 1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
 - 2. Complementary and alternative therapies (e.g., physical therapy, acupuncture, laser, hyperbaric)
 - 3. Adverse and unintended effects
 - 4. Hospitalization, individual and population/habitat management
- iii. Understand principles, application and appropriateness of surgery
 - 1. Soft tissue and orthopedic, including beak management
 - 2. Endoscopy and minimally invasive techniques
 - 3. Risk and outcome assessment

VI. Mortality and Crisis Management

A. Mortality events and post-mortem analysis

- i. Recognize normal and abnormal gross necropsy findings
- ii. Select appropriate postmortem samples
- iii. Interpret important histopathologic findings
- iv. Understand morbidity and mortality reviews

B. Understand management strategies for crisis situations

- i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications, evacuation plans)
- ii. Communication and reporting structure (e.g., reporting notifiable diseases)

VII. Conservation and One Health

A. Understand principles/terms of One Health

- i. Host range shift (e.g., animal escapes, feral/injurious populations)
- ii. Population declines or shifts (e.g., illegal procurement of wild animals)
- iii. Hazards of exposure to non-target animals, humans, and environment
- iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence

- i. Environment
 - 1. Climate change
 - 2. Land use change and encroachment

3. Resource management (energy, water, waste)
 4. Toxicology
 5. Pollution and environmental degradation (e.g., air quality)
- ii. Animal
 1. Inter-species disease transmission
 2. Unusual mortality events
 3. Animals as sentinels
 - iii. Human
 1. Food safety, drug residue and withdrawal times
 2. Public health
 3. Zoonoses
 4. Wildlife human interface, physical dangers, escape protocols

ACZM Qualifying Examination Content Outline - Herpetofauna

- I. Clinically relevant biology
 - A. Understand clinically significant differences among species
 - i. Anatomical
 - ii. Physiological
 - iii. Ecological
 - B. Recognize taxonomy and phylogeny
 - C. Understand appropriate/natural behaviors and social structures
- II. Environmental factors
 - A. Recognize potential hazards and understand differential effects across taxonomic groups
 - i. Biological
 - ii. Chemical
 - iii. Physical
 - B. Understand taxon-specific environmental management relative to clinically relevant ecology
 - i. Understand environmental conditions in relation to animal health and welfare in both field and managed environments.
 - i. Evaluate husbandry and life support systems (e.g., enclosures, water, ventilation, heating, humidity, lighting, substrate)
 - ii. Understand principles of sanitation and disinfection
 - C. Understand principles of epidemiology
 - i. Disease surveillance
 - ii. Risk analysis
- III. Preventive Medicine and Wellness
 - A. Understand principles of nutrition
 - i. Dietary requirements, formulation and delivery
 - ii. Food handling, storage and safety
 - B. Understand behavior and welfare management
 - i. Five Freedoms and Five Domains
 - ii. Species-specific natural behaviors
 - iii. Inappropriate behaviors
 - iv. Environmental enrichment
 - v. Behavioral training
 - vi. Objective criteria for welfare assessment
 - C. Evaluate pest control programs

- D. Evaluate preventive medicine/wellness programs
 - i. Biosecurity
 - ii. Health examination
 - iii. Vaccination
 - iv. Parasite management
 - v. Quarantine
 - vi. Life stage- and taxon-specific strategies
 - vii. Animal acquisitions and dispositions
 - viii. Population and reproductive management
- E. Evaluate end of life care
 - i. Objective criteria for euthanasia decisions
 - ii. Species-appropriate euthanasia techniques

IV. Restraint

- A. Understand appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
- B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
 - i. Mechanisms of action
 - ii. Administration and routes
 - iii. Clinical pharmacokinetics
 - iv. Clinical pharmacodynamics and potential adverse effects
- C. Recognize the safety implications for humans, non-target species, and the environment
- D. Understand appropriate use and clinical applications of capture, immobilization, and anesthetic monitoring equipment
- E. Recognize patient risks involved with capture and anesthesia
- F. Understand the principles of monitoring during restraint
 - i. Validation
 - ii. Interpretation
 - iii. Intervention
- G. Understand principles of safe animal transport

V. Medicine and Surgery

- A. Evaluate case history
- B. Recognize expected physical examination findings and abnormalities
- C. Understand the principles, collection, applications and limitations of antemortem diagnostic testing (on individual and population level)
 - i. Clinical and anatomic pathology (including serology and molecular testing)

- ii. Diagnostic imaging
- iii. Microbiology
- iv. Toxicology
- v. Other modalities

D. Evaluate case management

- i. Understand the pathophysiology of diseases and recognize differential diagnoses
- ii. Understand appropriate non-surgical therapies
 - 1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
 - 2. Complementary and alternative therapies (e.g., physical therapy, acupuncture, laser, hyperbaric)
 - 3. Adverse and unintended effects
 - 4. Hospitalization, individual and population/habitat management
- iii. Understand principles, application and appropriateness of surgery
 - 1. Soft tissue, orthopedic and orodental procedures
 - 2. Endoscopy and minimally invasive techniques
 - 3. Risk and outcome assessment

VI. Mortality and Crisis Management

A. Mortality events and post-mortem analysis

- i. Recognize normal and abnormal gross necropsy findings
- ii. Select appropriate postmortem samples
- iii. Interpret important histopathologic findings
- iv. Understand morbidity and mortality reviews

B. Understand management strategies for crisis situations

- i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications, evacuation plans)
- ii. Communication and reporting structure (e.g., reporting notifiable diseases)

VII. Conservation and One Health

A. Understand principles/terms of One Health

- i. Host range shift (e.g., animal escapes, feral/injurious/invasive populations)
- ii. Population declines or shifts (e.g., illegal procurement of wild animals)
- iii. Hazards of exposure to non-target animals, humans, and environment
- iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence

- i. Environment
 - 1. Climate change
 - 2. Land use change and encroachment

3. Resource management (energy, water, waste)
 4. Toxicology
 5. Pollution and environmental degradation (e.g., air quality)
- ii. Animal
 1. Inter-species disease transmission
 2. Unusual mortality events
 3. Animals as sentinels
 - iii. Human
 1. Food safety, drug residue and withdrawal times
 2. Public health
 3. Zoonoses
 4. Wildlife human interface, physical dangers, escape protocols

ACZM Qualifying Examination Content Outline - Terrestrial Mammals

- I. Clinically relevant biology
 - A. Understand clinically significant differences among species
 - i. Anatomical
 - ii. Physiological
 - iii. Ecological
 - B. Recognize taxonomy and phylogeny
 - C. Understand appropriate/natural behaviors and social structures
- II. Environmental factors
 - A. Recognize potential hazards and understand differential effects across taxonomic groups
 - i. Biological
 - ii. Chemical
 - iii. Physical
 - B. Understand taxon-specific environmental management relative to clinically relevant ecology
 - i. Understand environmental conditions in relation to animal health and welfare in both field and managed environments
 - ii. Evaluate husbandry and life support systems (e.g., enclosures, water, ventilation, heating, humidity, lighting, substrate)
 - iii. Understand principles of sanitation and disinfection
 - C. Understand principles of epidemiology
 - i. Disease surveillance
 - ii. Risk analysis
- III. Preventive Medicine and Wellness
 - A. Understand principles of nutrition
 - i. Dietary requirements, formulation and delivery
 - ii. Food handling, storage and safety
 - B. Understand behavior and welfare management
 - i. Five Freedoms and Five Domains
 - ii. Species-specific natural behaviors
 - iii. Inappropriate behaviors
 - iv. Environmental enrichment
 - v. Behavioral training
 - vi. Objective criteria for welfare assessment
 - C. Evaluate pest control programs

- D. Evaluate preventive medicine/wellness programs
 - i. Biosecurity
 - ii. Health examination
 - iii. Vaccination
 - iv. Parasite management
 - v. Quarantine
 - vi. Life stage- and taxon-specific strategies
 - vii. Animal acquisitions and dispositions
 - viii. Population and reproductive management
- E. Evaluate end of life care
 - i. Objective criteria for euthanasia decisions
 - ii. Species-appropriate euthanasia techniques

IV. Restraint

- A. Understand appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
- B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
 - i. Mechanisms of action
 - ii. Administration and routes
 - iii. Clinical pharmacokinetics
 - iv. Clinical pharmacodynamics and potential adverse effects
- C. Recognize the safety implications for humans, non-target species, and the environment
- D. Understand appropriate use of capture, immobilization, and anesthetic monitoring equipment
- E. Recognize patient risks involved with capture and anesthesia
- F. Understand the principles of monitoring during restraint
 - i. Validation
 - ii. Interpretation
 - iii. Intervention
- G. Understand principles of safe animal transport

V. Medicine and Surgery

- A. Evaluate case history
- B. Recognize expected physical examination findings and abnormalities
- C. Understand the principles, collection, applications and limitations of antemortem diagnostic testing (on individual and population level)
 - i. Clinical and anatomic pathology (including serology and molecular testing)

- ii. Diagnostic imaging
- iii. Microbiology
- iv. Toxicology
- v. Other modalities

D. Evaluate case management

- i. Understand the pathophysiology of diseases and recognize differential diagnoses
- ii. Understand appropriate non-surgical therapies
 - 1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
 - 2. Complementary and alternative therapies (e.g., physical therapy, acupuncture, laser, hyperbaric)
 - 3. Adverse and unintended effects
 - 4. Hospitalization, individual and population/habitat management
- iii. Understand principles, application and appropriateness of surgery
 - 1. Soft tissue, orthopedic and orodental procedures
 - 1. Endoscopy and minimally invasive techniques
 - 2. Risk and outcome assessment

VI. Mortality and Crisis Management

A. Mortality events and post-mortem analysis

- i. Recognize normal and abnormal gross necropsy findings
- ii. Select appropriate postmortem samples
- iii. Interpret important histopathologic findings
- iv. Understand morbidity and mortality reviews

B. Understand management strategies for crisis situations

- i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications, evacuation plans)
- ii. Communication and reporting structure (e.g., incident command)

VII. Conservation and One Health

A. Understand principles/terms of One Health

- i. Host range shift (e.g., spillover)
- ii. Population declines or shifts
- iii. Hazards of exposure to non-target animals, humans, and environment
- iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence

- i. Environment
 - 1. Climate change
 - 2. Land use change and encroachment

3. Resource management (energy, water, waste)
 4. Toxicology
 5. Pollution and environmental degradation (e.g., air quality)
- ii. Animal
 1. Inter-species disease communication
 2. Unusual mortality events
 3. Animals as sentinels
 - iii. Human
 1. Food safety, drug residue and withdrawal times
 2. Public health
 3. Zoonoses
 4. Wildlife human interface, physical dangers, escape protocols

ACZM Qualifying Examination Content Outline - Wildlife

- I. Relevant biology and ecology
 - A. Understand clinically significant differences among species
 - i. Anatomical
 - ii. Physiological
 - iii. Ecological
 - B. Recognize taxonomy and phylogeny
 - C. Understand appropriate/natural behaviors and social structures
- II. Environmental factors
 - A. Recognize potential hazards and understand differential effects across taxonomic groups
 - i. Biological (e.g., algal blooms)
 - ii. Chemical (e.g., pesticides, contaminants)
 - iii. Physical (e.g., highways, dams, turbines)
 - B. Understand animal and ecosystem ecology relevant to wildlife health and management
 - i. Understand environmental conditions in relation to animal health and welfare in both field and managed environments
 - ii. Understand principles of biosecurity
 - iii. Understand basic wildlife management techniques
 - C. Understand principles of epidemiology
 - i. Measures of disease (e.g., prevalence, incidence, R0)
 - ii. Disease surveillance and outbreak investigation
 - iii. Risk analysis
 - iv. Population implications of intervention (treatment, vaccination, culling, etc.)
- III. Population Medicine
 - A. Understand principles of ecosystem health
 - i. Ecosystem stability and resilience
 - ii. Habitat assessment and management
 - iii. Ecosystem disturbance (contaminants, climate change, human activities)
 - iv. Legal and illegal harvest
 - B. Understand principles of captive wildlife management, rehabilitation and reintroduction programs
 - i. Nutrition
 - ii. Husbandry, stress reduction, and preservation of natural behaviors

- iii. Disposition decision making (euthanasia, release, captive placement)
 - iv. Health examination
 - v. Parasite management
 - vi. Quarantine and biosecurity
- C. Understand principles of invasive species management
- D. Understand principles of study design and interpretation
- E. Understand principles of preventative medicine
 - i. Biosecurity between sites
 - ii. Translocation and culling
 - iii. Population and reproductive management
 - iv. Wildlife and livestock interface
 - v. Pharmaceutical intervention in wild populations
- F. Understand principles of euthanasia
 - i. Objective criteria for euthanasia decisions
 - ii. Species-appropriate euthanasia techniques

IV. Restraint

- A. Recognize importance of natural history and biology with regard to appropriate capture and restraint techniques
- B. Understand appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
 - i. Mechanisms of action
 - ii. Administration and routes
 - iii. Clinical pharmacokinetics
 - iv. Clinical pharmacodynamics and potential adverse effects
- C. Recognize the safety implications for humans, non-target species, and the environment
- D. Understand appropriate use of capture, immobilization, and anesthetic monitoring equipment
- E. Recognize patient risks involved with capture and anesthesia
- F. Understand the principles of monitoring during restraint
 - i. Clinical applications
 - ii. Interpretation
 - iii. Intervention
- G. Understand principles of safe animal transport

V. Medicine and Surgery

- A. Evaluate case history
- B. Recognize expected physical examination findings and abnormalities

- C. Understand the principles, collection, applications and limitations of antemortem diagnostic testing (on individual and population level)
 - i. Clinical and anatomic pathology (including serology and molecular testing)
 - ii. Diagnostic imaging
 - iii. Microbiology
 - iv. Toxicology
 - v. Other modalities
- D. Evaluate case management
 - i. Understand the pathophysiology of diseases and recognize differential diagnoses
 - ii. Understand appropriate non-surgical therapies
 - 1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
 - 2. Complementary and alternative therapies (e.g., physical therapy, laser)
 - 3. Adverse and unintended effects
 - 4. Hospitalization, individual, population, and habitat management
 - iii. Understand principles, application and appropriateness of conventional and field surgery
 - 1. Soft tissue and orthopedic procedures
 - 2. Endoscopy and minimally invasive techniques
 - 3. Risk and outcome assessment
 - iv. Understand ethical issues associated with interventions for medical, management and research purposes

VI. Mortality and Crisis Management

- A. Recognize mortality events and understand post-mortem analysis
 - i. Field data collection
 - ii. Recognize normal and abnormal gross necropsy findings
 - iii. Select appropriate postmortem samples
 - iv. Interpret important histopathologic findings
 - v. Understand morbidity and mortality reviews
- B. Understand management strategies for crisis situations
 - i. Mitigation strategies (e.g., habitat modifications/closures, evacuation plans)
 - ii. Communication and reporting structure (e.g., incident command)

VII. Conservation and One Health

A. Understand principles/terms of One Health

- i. Host range shift (e.g., spillover)
- ii. Population declines or shifts
 - 1. Extinction events
 - 2. Loss of biodiversity
 - 3. Invasive species and disease risks
- iii. Hazards of exposure to non-target animals, humans, and environment
- iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence

- i. Environment
 - 1. Climate change
 - 2. Land use change and encroachment
 - 3. Resource management (energy, water, waste)
 - 4. Toxicology
 - 5. Pollution and environmental degradation (e.g., air quality)
- ii. Animal
 - 1. Inter-species disease transmission
 - 2. Unusual mortality events
 - 3. Animals as sentinels
- iii. Human
 - 1. Food safety, drug residue and withdrawal times
 - 2. Public health
 - 3. Zoonoses
 - 4. Wildlife human interface and physical dangers

Table 16: Exam Specifications by Content Domain

Domain	Aquatics	Avian	Herpetofauna	Terrestrial Mammals
I: Clinically relevant biology	12-16%	13-17%	12-16%	11-15%
II: Environmental factors	12-16%	8-12%	13-17%	8-12%
III: Preventive Medicine and Wellness	17-21%	17-21%	16-20%	18-22%
IV: Restraint	15-19%	16-20%	15-19%	19-23%
V: Medicine and Surgery	20-24%	22-26%	20-24%	21-25%
VI: Mortality and Crisis Management	8-10%	9-11%	8-10%	8-10%
VII: Conservation and One Health	6-8%	5-7%	6-8%	5-7%

Table 17: Exam Specifications by Content Domain (Wildlife)

Domain	Wildlife
I: Relevant biology and ecology	11-15%
II: Environmental factors	11-15%
III: Population Medicine	15-19%
IV: Restraint	14-18%
V: Medicine and Surgery	12-16%
VI: Mortality and Crisis Management	14-18%
VII: Conservation and One Health	13-17%