

Robert M. Timm,¹ Terrell P. Salmon,² and Robert H. Schmidt³

Key Word Standardization in Vertebrate Pest Control

REFERENCE: Timm, R. M., Salmon, T. P., and Schmidt, R. H., "Key Word Standardization in Vertebrate Pest Control," *Vertebrate Pest Control and Management Materials: 5th Volume, ASTM STP 974*, S. A. Shumake and R. W. Bullard, Eds., American Society for Testing and Materials, Philadelphia, 1987, pp. 3-11.

ABSTRACT: Key words are becoming more useful as a means of locating bibliographic material. We expect their utility to increase as more persons use computers to store and retrieve information in data bases.

Previous ASTM Vertebrate Pest Control and Management Materials symposia proceedings have required the inclusion of key words; however, we have found that there is too much variability among these key words to enable them to be efficiently used. In the previous four symposia volumes, 104 articles used 469 different key words ($\bar{X} = 7.38$ key words per article). Only 12 key words were used more than five times and 375 were used once. We found many examples of synonymous key words. When used in computer information systems, this lack of standardization makes retrieval difficult or less productive.

We propose guidelines for choosing key words. Further, we give a suggested list of key words for articles dealing with vertebrate pest control. Use of these guidelines should lend a greater uniformity to information storage and retrieval in this field by aiding authors, editors, persons searching the literature, and persons developing their own data bases.

KEY WORDS: vertebrate pest control, key words, data bases, index, computers, computer retrieval, guidelines, standards

In the field of vertebrate pest control, the expanding base of published information and its tendency to be scattered among many different journals and other publications make management of this data base difficult. Key words are a useful tool to assist persons with finding and managing pertinent literature. Previous ASTM Vertebrate Pest Control and Management Materials symposia proceedings have utilized key words to assist those who index or retrieve the articles appearing in these publications.

Major data bases of literature are indexed in one of two ways. In the first, a publication is described by a set of key words or descriptive phrases chosen from a standardized list or thesaurus of terms. The U.S. National Agricultural Library has recently adopted the thesaurus of terms published by the Commonwealth Agricultural Bureau (CAB) [1] for this purpose. Advantages of using standard lists such as the *CAB Thesaurus* include elimination of many synonymous terms, making searching and retrieving more efficient. The second approach is to develop an "uncontrolled vocabulary" based simply on titles of publications and on information in abstracts, summaries, or the main body of the publication. This approach is followed by *Biologi-*

¹Extension vertebrate pest specialist, Department of Forestry, Fisheries & Wildlife, University of Nebraska, Lincoln, NE 68583-0819; presently, superintendent, Hopland Field Station, University of California, Hopland, CA 95449.

²Extension wildlife specialist, Wildlife Extension, University of California, Davis, CA 95616.

³Research assistant, Wildlife Extension, University of California, Davis, CA 95616; presently, natural resource specialist, University of California Cooperative Extension, Hopland Field Station, Hopland, CA 95449.

cal Abstracts [2]. An advantage of this approach is the timely incorporation of new terms into the descriptive vocabulary. It has a disadvantage of dealing with synonymous terms, making searching less efficient. In some cases searching by such systems is aided by coding publications to a finite list of subject categories.

The *ASTM Style Manual* [3] states that "The use of universally accepted key terms for automated retrieval systems is essential." Standardization of such key words assists authors, editors, and indexers to be consistent when developing data bases, thus increasing success and efficiency in searching data bases.

We have found that key words used in the four previous ASTM Vertebrate Pest Control and Management Materials symposia proceedings are too variable to enable them to be used efficiently in electronic searching. In these volumes, 104 articles used 469 different key words, with a mean of 7.38 key words per article (Standard Deviation = 3.36). Individual articles used between 3 and 21 key words. Although there was a tendency for the mean number of key words per article to increase with each succeeding publication, no significant difference in mean number of key words among the four proceedings was found ($P > 0.5$, analysis of variance). When too few key words are used, they may not adequately describe the information contained in the article and will lessen its chances of retrieval. Only 12 key words were used more than five times, and 375 key words were used only once. Additionally, we found many examples of synonymous key words. For example, the words or phrases "efficacy determination," "efficacy evaluation," "efficacy test," and "efficacy tests" all appear. Similarly, "field test," "field test method," "field test protocol," "field testing," and "field trials" are found as key words among these articles. When conducting data searches in which an exact match of terms is required, this lack of standardization interferes with successful searching.

In recent years, personal computers with data base management software have received increased use in managing personal libraries. We believe that standardized key words will also assist persons developing their personal data bases to be consistent and efficient in using such systems.

The objectives of this paper are to propose guidelines for choosing key words, and to suggest a standardized list of key words that are pertinent to the field of vertebrate pest control.

Guidelines for Choosing Key Words

Singular Versus Plural Forms—We recommend that the plural form be employed for classes of things and organisms (that is, "chemosterilants," "diseases," "pesticides," "traps," "rodents," "Norway rats"). The singular should be reserved for processes and unique things (for example, "taste aversion," "formulation," "lethal dose," "toxic perch"). When the distinction is not clear, use plurals.

Species and Taxonomic Names—When literature describes particular species or groups of related species, it is important to use the full scientific names for genus, species, and subspecies as applicable. To maintain a constant nomenclature, standard taxonomic references should be used. For mammals, we suggest Hall [4], and for birds the standard reference is American Ornithologists' Union [5]. Additionally, scientific names for the Family and Order may be usefully included as key words. Include the common name(s) for the species or group as appropriate. For example, an article describing the efficacy of a particular bait on Norway rats would include the following key words: *Rattus norvegicus*, Muridae, Rodentia, Norway rats, rats, rodents, commensal rodents.

Chemical and Trade Names—When literature describes chemical elements or compounds, they should be described by key words which give their common chemical and trade names and also their full chemical name, if in common use. Naming the group of compounds to which the specific compound belongs, either by chemical name or by target group, is also useful. A publication on the toxicity of 3-chloro-*p*-toluidine hydrochloride would include the following key words: Starlicide, 3-chloro-*p*-toluidine hydrochloride, avicides.

Crops or Resources—Where literature describes resources, agricultural crops or products, etc., these should be described both as generally and specifically as appropriate. For example, an article about vole damage to apple orchards might include the following key words: apples, apple orchards, fruit orchards, orchards, apple trees, fruit trees.

Geographical Location—When literature makes specific reference to site or locality, this location should be described both precisely and generally, as appropriate and applicable. For example, an article on livestock predation in Nebraska might include the following key words: Nebraska, Great Plains, USA, North America.

General Terms—We propose that the phrase “vertebrate pest control” continue to be used to describe all articles within this field. Nearly all previous articles in this symposium series have used this as a key word. Additionally, the phrase “wildlife management” can be added as desired to indicate the inclusion of the specialized field within a larger framework.

Proposed Key Word Lists

Appendix 1 is a proposed list of key words to be used in describing articles in the field of vertebrate pest control. In this table, the words are grouped in an outline form according to subject. Appendix 2 is the same list of words in alphabetical order.

These words have been derived from a variety of sources, and particularly from those key words already used in the previous ASTM symposia proceedings. Synonyms have been eliminated wherever possible. In order to keep the word list to a workable length, words not specific to vertebrate pest control have largely been omitted. Such terms, more generalized than the ones included in this list, often may be desirable to include as key words for particular articles. Examples of these terms are as follows: climate, contamination, design, education, identification, methods, policy, regulation, standards.

Persons utilizing this list should consider the words listed here to be a starting point rather than a complete list of all possible key words. Authors or editors can choose appropriate key words from this list and then add additional descriptive terms as appropriate to more fully describe the article.

APPENDIX 1

Proposed Key Words for Vertebrate Pest Control, Arranged by Subject Category

General Terms	Estivation
Animal damage control	Hibernation
Efficacy	Aversion
Hazards	Aversive conditioning
Infestation	Aversives
Nontarget organisms*	Bait shyness
Nontarget species	Food aversion
Pest control operators	Neophobia
Pest management	Taste aversion
Plant protection	Communication
Protection	Chemical communication
Residual effects*	Vocalizations
Safety*	Feeding
Vertebrate pest control	Acceptance
Wildlife management*	Bait acceptance
Behavior	Browsing
Activity	Food habits

- Food preference
- Food storage
- Grooming
- Habituation
- Movement
 - Dispersal
 - Emigration
 - Home range
 - Homing behavior
 - Immigration
 - Migration
- Preference
- Social Behavior
 - Dominance
 - Flocking
- Sensory Perception
 - Attractants
 - Colors
 - Gustation
 - Lures
 - Odors
 - Olfaction
 - Pheromones
 - Scent*
 - Stimuli
 - Taste
- Biology
 - Age Breeding
 - Burrows
 - Dens
 - Ectoparasites
 - Endoparasites
 - Energetics
 - Feces
 - Growth
 - Mortality
 - Natality
 - Nesting
 - Parasites
 - Physiology
 - Reproduction
- Control*
- Control Methods
 - Biological control*
 - Antifertility agents
 - Biocontrol
 - Chemosterilants
 - Diseases
 - Epizootics
 - Habitat management*
 - Resistant varieties
 - Sterility*
 - Zoonoses
 - Cultural practices
 - Agricultural practices
 - Alternate feeding
 - Decoy crops
- Refuges
- Sanitation
- Supplemental feeding
- Exclusion
 - Electric fence
 - Exclosures
 - Fences*
 - Netting
- Frightening
 - Alarm calls
 - Auditory repellents
 - Distress calls
 - Effigies
 - Guard animals
 - Harassment*
 - Sound
 - Ultrasound
- Lethal Methods
 - Kill*
 - Shooting*
 - Aerial hunting
 - Guns*
 - Hunting*
 - Immobilization*
 - Tranquilizers*
 - Pesticides*
- Chemical compounds*
 - Drugs
- Repellents*
 - Chemical repellents
- Stupeficients
- Toxicants
 - Acute toxicity
 - Antidotes
 - Avicides
 - Chronic toxicity
 - Contact toxicants
 - Fumigants
 - Gas cartridges
 - Lethal dose
 - Mammal control agents*
 - Pharmacology
 - Pesticides
 - Poisons*
 - Predacides
 - Primary poisoning
 - Rodenticides
 - Secondary poisoning
 - Subacute toxicity
 - Tolerance*
 - Toxicity*
- Toxicant Application
 - Aerial application
 - Baiting
 - Broadcast
 - Dry baits
 - Ground sprays

- Spraying
- Toxicant Formulation
 - Baits
 - Carriers
 - Dyes
 - Emetics
 - Formulation
 - Liquids
 - Microencapsulation
 - Shelf life
 - Stability
 - Surfactants
 - Tracking powders
- Trapping*
 - Glue boards
 - Glues
 - Kill traps
 - Live traps
 - Snares
 - Snaring
 - Traps*
- Control Strategies
 - Bounties
 - Integrated pest management
 - IPM
 - Maintenance baiting
 - Modeling
 - Models
 - Population control*
 - Population regulation
 - Strategies
 - Thresholds
- Damage
 - Damage by Wildlife*
 - Debarking
 - Depredation
 - Predation*
 - Resources Damaged
 - Assessment
 - Agriculture
 - Containers
 - Crops
 - Damage Assessment
 - Farms
 - Feed
 - Forage
 - Forestry
 - Grain
 - Horticulture
 - Livestock
 - Public health
 - Rangeland
 - Urban
- Economics
 - Cost
 - Cost analysis
 - Cost-benefit
- Economic damage
- Economic factors*
- Socioeconomic studies*
- Materials and Equipment
 - Anesthetics
 - Bait boxes
 - Bait stations
 - Burrow builder
 - Cages
 - Computers
 - Devices
 - Equipment
 - M-44
 - Materials
 - Pens
 - Perches
 - Recordings
 - Toxic collar
 - Toxic perch
 - Toxic wick
- Techniques
 - Biopsy
 - Biotelemetry
 - Captivity
 - Capture
 - Capturing methods*
 - Census
 - Census methods
 - Count
 - Data collection
 - Detection
 - Enclosures
 - Enclosures and exclosures*
 - Forecasting
 - Mark-recapture
 - Marking
 - Monitoring
 - Necropsy
 - Population estimation
 - Prebaiting
 - Prediction
 - Protocol
 - Radiotelemetry
 - Sampling
 - Surveillance
 - Surveys
 - Tagging
 - Telemetry
 - Testing*
 - Analysis
 - Bioassays
 - Cafeteria design
 - Cage tests
 - Evaluation*
 - Experimental design*
 - Field tests
 - Intubation

Laboratory testing	Exotics
LD ₅₀ method	Feral animals
LC ₅₀ method	Fishes
Pen trials	Introduced species
Tests	Mammals
Transects	Predators*
Visual counts	Reptiles
Vertebrate Organisms	Rodents
Amphibians	Commensal rodents
Animals, nuisance*	Field rodents
Big game	Vertebrates
Birds	Vertebrate pests

*These terms appear in the *Fish and Wildlife Reference Service Thesaurus* [6].

APPENDIX 2

Proposed Key Words for Vertebrate Pest Control, in Alphabetical Order

Acceptance	Biopsy
Activity	Biotelemetry
Acute toxicity	Birds
Aerial application	Bounties
Aerial hunting	Breeding
Age	Broadcast
Agricultural practices	Browsing
Agriculture	Burrow builder
Alarm calls	Burrows
Alternate feeding	Cafeteria design
Amphibians	Cage tests
Analysis	Cages
Anesthetics	Captivity
Animal damage control	Capture
Animals, nuisance*	Capturing methods*
Antidotes	Carriers
Assessment	Census
Attractants	Census methods
Auditory repellents	Chemical communication
Aversion	Chemical compounds*
Aversive conditioning	Chemical repellents
Aversives	Chemosterilants
Avicides	Chronic toxicity
Bait acceptance	Colors
Bait boxes	Commensal rodents
Bait shyness	Communication
Bait stations	Computers
Baiting	Contact toxicants
Baits	Containers
Behavior	Control Methods
Big game	Control Strategies
Bioassays	Control*
Biocontrol	Cost
Biological control*	Cost analysis
Biology	Cost-benefit

Count
 Crops
 Cultural practices
 Damage
 Damage Assessment
 Damage by Wildlife*
 Data collection
 Decoy crops
 Dens
 Depredation
 Detection
 Devices
 Diseases
 Dispersal
 Dominance
 Dry baits
 Dyes
 Economic damage
 Economic factors*
 Economics
 Ectoparasites
 Efficacy
 Effigies
 Electric fence
 Emetics
 Emigration
 Enclosures
 Enclosures and exclosures*
 Endoparasites
 Energetics
 Epizootics
 Equipment
 Estivation
 Evaluation*
 Exclosures
 Exclusion
 Exotics
 Experimental design*
 Farms
 Feces
 Feed
 Feeding
 Fences*
 Feral animals
 Field rodents
 Field tests
 Fishes
 Flocking
 Food aversion
 Food habits
 Food preference
 Food storage
 Forage
 Forecasting
 Forestry
 Formulation
 Frightening
 Fumigants
 Gas cartridges
 Glue boards
 Glues
 Grain
 Grooming
 Ground sprays
 Growth
 Guard animals
 Guns*
 Gustation
 Habitat management*
 Habituation
 Harassment*
 Hazards
 Hibernation
 Home range
 Homing behavior
 Horticulture
 Hunting*
 Immigration
 Immobilization*
 Infestation
 Integrated pest management
 Introduced species
 Intubation
 IPM
 Kill traps
 Kill*
 Laboratory testing
 LD₅₀ method
 LC₅₀ method
 Lethal dose
 Lethal Methods
 Liquids
 Live traps
 Livestock
 Lures
 M-44
 Maintenance baiting
 Mammal control agents*
 Mammals
 Mark-recapture
 Marking
 Materials
 Materials and Equipment
 Microencapsulation
 Migration
 Models
 Monitoring
 Mortality
 Movement
 Natality
 Necropsy
 Neophobia
 Nesting
 Netting

Nontarget organisms*	Shooting*
Nontarget species	Snares
Odors	Snaring
Olfaction	Social Behavior
Parasites	Socioeconomic studies*
Pen trials	Sound
Pens	Spraying
Perches	Stability
Pest control operators	Sterility*
Pest management	Stimuli
Pesticides*	Strategies
Pharmacology	Stupeficients
Pheromones	Supplemental feeding
Physiology	Surfactants
Piscicides	Surveillance
Plant protection	Surveys
Poisons*	Tagging
Population control*	Taste
Population estimation	Taste aversion
Prebaiting	Techniques
Predacides	Telemetry
Predation*	Testing*
Predators*	Tests
Prediction	Thresholds
Preference	Tolerance*
Primary poisoning	Toxic collar
Protection	Toxic perch
Protocol	Toxic wick
Public health	Toxicant Application
Radiotelemetry	Toxicant Formulation
Rangeland	Toxicants
Recordings	Toxicity*
Refuges	Tracking powders
Repellents*	Tranquilizers*
Reproduction	Transects
Reptiles	Trapping*
Residual effects*	Traps*
Resources Damaged	Ultrasound
Rodenticides	Urban
Rodents	Vertebrate Organisms
Safety*	Vertebrate pest control
Sampling	Vertebrate pests
Sanitation	Vertebrates
Scent*	Visual counts
Secondary poisoning	Vocalizations
Sensory Perception	Wildlife management*
Shelf life	Zoonoses

* These terms appear in the *Fish and Wildlife Service Reference Service Thesaurus* [6].

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