

Information Resources for Animal Control and Wildlife Damage Management

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Figure 1. USDA's National Wildlife Research Center maintains a specialized collection of wildlife damage management books, papers, and unpublished reports.

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Introduction

A bumper sticker reads, “If you think education is expensive, you oughta try ignorance.” That statement could not be truer in regard to wildlife damage management. Being willing to learn is a critical attitude for everyone involved in wildlife damage management. Since wildlife damage management intersects so many other disciplines, no single person can be an expert in all of them. In addition, the arrival of an invasive species, changes in building practices (e.g., egress windows, ridge vents), or the implementation of new regulations can confound traditional practices and require new control methods. Thus, it is important to provide a resource that provides detailed, updated and accurate information.

Since the publication of the 1994 Prevention and Control of Wildlife Damage handbook, there has been a remarkable increase in the volume and quality of information related to wildlife damage management. The rise of the digital age has empowered people to transmit their knowledge and ideas in writing, pictures, and video. A few decades ago, local, state, and federal government wildlife biologists were the primary practitioners of animal control and damage management. Private pest management firms involved in vertebrate animal problems were primarily limited to the control of urban birds and commensal rodents. This situation has changed substantially since the 1990s.

The nuisance wildlife control industry has matured. The increased involvement of the private sector in wildlife control unleashed the creative forces of entrepreneurs in the development of new techniques and products.

Until the mid-1980's, most scientific information about wildlife damage management was scattered in articles in academic journals (e.g., *Journal of Wildlife Management*), "grey literature" (i.e., unpublished reports and conference proceedings), and government documents (i.e., U.S. Fish and Wildlife Service and Forest Service publications). Since then, wildlife damage management research has achieved greater prominence as demonstrated by the addition of new outlets and changes in publication policies.

The emergence and rapid growth of the nuisance wildlife control industry has supported development of several trade magazines, association newsletters, listservs, bulletin boards, and numerous websites. A few decades ago, relevant research papers only numbered a few hundred a year, now computer search engines return thousands of hits, putting a premium on effective search strategies to obtain information. Digital copies of papers of are often available at no or nominal cost. The volume of information related to wildlife damage management is now enormous. In this publication, we have highlighted important works to supplement the sources found in the various publications of the Wildlife Damage Management Technical Series. In addition, we have focused on information resources that are easily obtained, used primarily for the North American audience, and published since 1994. Materials from journals and other publications with restricted access are mentioned only when we believe the utility of the information justifies the effort involved to obtain them. The numerous websites referenced were checked for current access during October 2019.

Books, Booklets and Videos

Since the 1994 edition of *Prevention and Control of Wildlife Damage*, several new books have been written to review literature, recount personal experiences managing wildlife damage, and promote damage management as an

emerging professional discipline. A number of these books are peer-reviewed academic textbooks suitable for college classes and are available from the publishers or from major booksellers.

In addition, fur harvesters, wildlife control operators, and wildlife biologists have published privately or worked through vanity publishers to produce an enormous number of books, booklets, and videos. These materials generally are not available from popular book retailers and rarely appear in standard literature searches. Such publications are generally available at trade shows, association meetings, or from supply companies servicing fur harvesters or wildlife control operators. Quality of information varies widely, but may contain valuable information primarily related to personal experiences with legally harvestable species.

Recommended books, booklets, and videos include the following:

Adams, C.E. and K.J. Lindsey. 2010. *Urban Wildlife Management*, 2nd edition. CRC Press, Taylor and Francis Group, Boca Raton, Florida, USA. 336 pp. Organized primarily as an overview of urban habitat types and sociopolitical issues, the book takes a broad approach, discussing a host of problem or potentially problematic species, ranging well beyond commensal rodents, and invasive urban birds. The authors discuss human dimensions, management of organizations, and legal considerations in some detail. Current and historical supporting literature is presented chapter by chapter.

Bennett, G.W., J.M. Owens, and R.M. Corrigan. 2010. *Truman's Scientific Guide to Pest Management Operations*, 7th edition. Purdue University and Pest Management Professional Magazine, Lafayette, Indiana, USA. 718 pp. One of the early comprehensive pest control textbooks, first published in 1962, this manual focuses on problems encountered in structural and stored product pest management. Through seven editions, it has stayed current in reflecting changes in the pest management industry and includes information on rodent and bird damage and management.

Buckle, A.P. and R.M. Smith, Eds. 2015. Rodent Pests and Their Control, 2nd edition, CABI, Oxfordshire, UK. 422 pp.

This book provides a comprehensive overview of global rodent problems in all types of habitats, along with practical methods of control. It references access to current range maps for problem species. Also, there are chapters that address rodent biology, natural history, rodent control research and development, product testing, impact assessment, program development, use of media in organizing and promoting control programs, development of humane and ethical methods.

Conover, M. 2001. Resolving Human-Wildlife Conflicts – The Science of Wildlife Damage Management. Lewis Publishers, Boca Raton, Florida, USA. 418pp. Conover's book is an extensive treatment of all types of wildlife problems. Designed primarily as an upper-level or graduate textbook, it provides review of scientific literature, case-studies of problem resolution, and the relationship between wildlife damage control with other aspects of wildlife management. The book also promotes the idea of wildlife damage management as a separate academic discipline and explores the history, philosophy, economics, and human dimensions of problem animal management.

Corrigan, R.M. 2001. Rodent Control: A Practical Guide for Pest Management Professionals. GIE Media, Cleveland, Ohio, USA. 355pp. Corrigan presents a comprehensive review of commensal rodents and rodent problems emphasizing practical information for pest management professionals. The book focuses on structural and landscape environments, such as homes, warehouses, food plants, zoological parks, livestock operations, and municipalities. Limited material is included on sylvatic species (deer mice, voles, and woodrats) that can become structural pests.

Curtis, P.D., and J. Shultz. 2008. Best Practices for Wildlife Control Operators. Thomson Delmar Learning, Clifton Park, NY. 350pp. A practical guide for wildlife control operators based on the 2002 manual used by the New York State Department of Conservation. The book is suitable for private or classroom use with listed learning objectives and review questions.

Davidson, W.R. 2006. Field Manual of Wildlife Diseases in the Southeastern United States, 3rd edition. University of Georgia, Atlanta, Georgia, USA. 417pp. Davidson has provided a guide to help users identify diseases in field settings. The text is very easy to read and readers can rapidly learn how diseases threaten wildlife and people. Although written for the southeast section of the U.S., readers throughout North America will find it useful.

Fournier, G. 2014. Coexisting with Local Furbearers: Good Practices in Management and Intervention. Fédération des Trappeurs Gestionnaires du Québec, Quebec, Canada. 248 pp. This lengthy manual reviews best practices in the prevention, management, and control of animal damage and nuisance issues caused by furbearing animals. It emphasizes avoidance of depredations and provides an array of permanent solutions, and efficient and humane control measures.

Friend, M., J.C. Franson, and E.A. Ciganovich. 1999. Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. U.S. Geological Survey, Biological Resources Division, Information and Technology Report 1999-001. 426pp. The manual covers general field procedures for collecting and preserving specimens for testing and identification of birds suffering injuries caused by bacteria, fungi, viruses, parasites, and chemicals. The book is fully illustrated with color prints, line drawings, and tables.

Friend, M., J.W. Hurley, P. Nol, and K. Wesenberg. 2006. Disease Emergence and Resurgence: The Wildlife-Human Connection. Reston, VA: U.S. Geological Survey, Circular 1285. 400pp. Using the concept of "one-health", Friend reviews how diseases pass between humans and wildlife. The text surveys zoonotic outbreaks, their impacts, and causes for their emergence. The text is supplemented with line drawings, maps, color photos, and tables.

Gehrt, S.D., S.P.D. Riley, and B.L. Cypher, editors. 2010. Urban Carnivores: Ecology, Conflict, and Conservation. Johns Hopkins University Press, Baltimore, MD. USA. 285pp. The text reviews in detail the life history, behavior, and human dimensions of various carnivores encountered in urban environments. Authors of each chapter summarize peer-reviewed literature.

Hadidian, J., M. Baird, M. Brasted, L. Nolfo-Clements, D. Pauli, and L. Simon. 2007. *Wild Neighbors: The Humane Approach to Living with Wildlife*. 2nd Ed. Humane Society of the United States, Washington, D.C., USA. 283pp. This book provides less-lethal control methods for 35 common nuisance species in the U.S.

Hedges, S., Ed. 2011. *Mallis Handbook of Pest Control*, 10th edition. The Mallis Handbook and Technical Training Co., Cleveland, Ohio, USA. 1454pp. The Mallis Handbook is updated periodically and primarily addresses the management of insects and rodents. The chapters on vertebrate pests provide key biological information along with a review of control methods. The chapter on commensal rodents is exceptionally informative.

Hone, J. 2007. *Wildlife Damage Control*. CSIRO Publishing, Collingwood, VIC, Australia. 179pp. Hone reviews the technical research related to wildlife damage control theory and its efficacy in achieving desired goals from a quantitative and statistical perspective. Topics include patterns in wildlife damage, biodiversity conservation, production, human and animal health, and recreation. Though written from an Australian viewpoint, the principles are applicable around the globe. The author assumes readers have at least three years of college-level training in biological sciences.

Hygnstrom, S., R. Timm, and G. Larson, Eds. 1994. *Prevention and Control of Wildlife Damage*, 4th edition, Volumes 1 and 2. Cooperative Extension Service, University of Nebraska, and USDA/APHIS/ADC, Lincoln, Nebraska, USA. This 2-volume manual in loose-leaf format is one of the most valuable references for wildlife damage management practitioners. It is organized by species covering virtually all the animals that become economic or nuisance problems in North America. In addition, there is considerable supporting information on registered products (including sample labels, sources of supplies and materials, and an index). A particularly valuable feature is its full availability online from the Internet Center for Wildlife Damage Management.

Krause, T. 2007. *The NTA Trapping Handbook – A Guide for Better Trapping*. The National Trappers Association, Bedford, Indiana, USA. 240pp. The 2nd edition of the NTA

Manual provides a discussion on the biology and behavior of 16 furbearer species, with updated range maps and detailed instructions for trapping. Extensive materials on fur handling, fur sales, wildlife management, trapper ethics, and Best Management Practices for Trapping are also presented.

Kreeger, T.J. and J.M. Arnemo, 2012. *Handbook of Wildlife Chemical Immobilization*, 4th edition. Terry Kreeger, Wheatland, Wyoming, USA. 448pp. This text summarizes legal, medical, use, and safety concerns related to the chemical immobilization of vertebrates.

Link, R. 2004. *Living with Wildlife: In the Pacific Northwest*. University of Washington Press and Washington Department of Fish and Wildlife, USA. 392pp. Link provides life history and comprehensive control information for dozens of species that conflict with human interests. The book is particularly informative in the area of animal exclusion.

Reidinger, R.F and J.E. Miller. 2013. *Wildlife Damage Management: Prevention, Problem Solving, and Conflict Resolution*. Johns Hopkins University Press, Baltimore, Maryland, USA. 243pp. In this up-to-date college textbook, the authors briefly survey the broad spectrum of inter-related topics that provide context and concept for the emerging sub-discipline of wildlife damage management. Eighteen chapters cover the entire range of damage control methodologies, but also summarize the historical, social, economic, and ecological underpinnings that inform and constrain management options. An extensive glossary collects the technical terms and concepts defined throughout the text. There are nearly 900 references ranging from the 1600's to 2012 that are particularly valuable for readers needing to obtain additional technical information. It is an essential current reference for students, academics, and working professionals dealing with wildlife damage problems.

Salmon, T.P., D.A. Whisson, and R.E. Marsh. 2006. *Wildlife Pest Control Around Gardens and Homes*, 2nd edition. University of California Division of Agriculture and Natural Resources Publications, Oakland, California, USA. 122pp. The book reviews the damage and control methods for the most common nuisance species in California. Full color

photos and superb line drawings illustrate how to identify and control damage. The authors provide essential information to understand animal behavior for the purposes of control.

Silvy, N.J., Ed. 2012. *The Wildlife Techniques Manual, 7th edition, Volumes 1-2.* Johns Hopkins University Press, Baltimore, Maryland. USA. 1100pp. The manual is updated substantially from the 2005 edition, reviewing techniques and literature across all aspects of wildlife management. Chapters on capture and handling, chemical immobilization, contaminants, wildlife health and surveillance, use of remote cameras, and identification and management of wildlife damage may be of particular interest.

Trout, J., Jr. 1997. *Nuisance Animals.* Midwest Publishing, Tennyson, Indiana. 192pp. Trout provides an overview of about 40 species of wildlife that become nuisance animals in some situations. Discussions focus primarily on animal biology and problem situations. Control methods are discussed briefly for each species, often using anecdotes to support opinions on effectiveness.

Vantassel, S.M. 2012. *Wildlife Damage Inspection Handbook, 3rd edition.* Wildlife Control Consultant, LLC, Lewistown, MT. 180pp. The handbook covers identification theory and practice for investigating damage in structures, gardens, and landscapes. It also summarizes how to investigate evidence, such as hair, scat, and bone and how to evaluate predator damage. The second half of the book provides detailed information identifying more than 26 common species associated with wildlife damage.

Vantassel, S.M. 2015. *Wildlife Removal Handbook, 3rd edition.* Wildlife Control Consultant, LLC, Lewistown, MT. 208 pp. The handbook explains how to get started in the wildlife control industry with chapters covering topics, such as inspecting structures, business issues, safety, effective use of cage and box traps, animal dispatch, and carcass disposal. The text covers control of the most common nuisance vertebrate species, including skunks, raccoons, gray squirrels, chipmunks, and feral cats. Particular emphasis is placed on control methods for commensal rodents.

Articles and Chapters on Wildlife Damage Management Literature

The following articles were published as part of larger works, such as magazines, journals, conference proceedings, or books. They were selected for their value in the succinct, but thorough, way the authors handled their particular topics.

Bajwa, W. and Kogan, M. 2003. Online resources for integrated pest management information delivery and exchange. Pages 9-18 in K.M. Maredia, D. Dakouo, and D. Mota-Sanchez. *Integrated Pest Management in the Global Arena.* CABI Publishing, Oxen, U.K. Discusses the various uses of the Internet in conducting Integrated Pest Management (IPM) programs, including literature search and retrieval, information resource access, and decision support systems. Provides extensive tables of relevant IPM related websites and information on various search engines. Reviews search strategies and ways to maximize the effectiveness of database searches.

Fall, M.W. and Jackson, W.B. 1999. Technical publication of wildlife damage research. Pages 173-178 in C.D. Lee and S.E. Hygnstrom, Eds. *Proc. Thirteenth Great Plains Wildlife Damage Workshop, Kansas State University.* Using 1995 as the snapshot year, the authors found eleven journals accounted for about 50% of peer-reviewed publications related to wildlife damage management. Overall, 524 research papers published in 1995 appeared in 135 journals. Staying abreast of current literature requires use of computer literature databases, subscription literature services, or use of a research library.

Love, C. and Kramer, J. 2007. Resources for wildlife professionals. *Wildlife Professional, Fall: 36-39.* Summarizes use of National Institutes of Health's National Library of Medicine online resources: PubMed for biomedical research, TOXNET for information on environmental health and toxicology, and Medicine Plus for personal health information.

Mason, M.K. undated. **Grey literature: its history, definition, acquisition, and cataloguing.** <http://www.moyak.com/papers/grey-technical-literature.html>. Mason discusses various definitions of grey literature to include quasi-printed reports, unpublished but circulated papers, unpublished conference proceedings, printed programs from conferences, and other non-unique material. The paper also discusses problems surrounding identification, acquisition, and cataloging of such literature and provides citations from several other authors who have discussed the subject.

Moore, J.L. 1980. **Wildlife management literature. Pages 7-38 in S. D. Schemnitz, Ed., Wildlife Management Techniques Manual, 4th edition, revised. The Wildlife Society, Washington, D.C.** Moore provides a comprehensive review of standard library source material including online and foreign sources. The article reviews a number of new computer-based search engines and portals that have emerged.

Virchow, D.R. and Hygnstrom, S.E. 2002. **The Internet Center for Wildlife Damage Management in the 21st century. Pages 345-347 in Proc. 20th Vertebr. Pest Conf., R.M. Timm and R.H. Schmidt, Eds.** Describes ICWDM as a clearinghouse for businesses, academics, agencies, and other organizations involved in wildlife damage management. Originally funded by the USDA Integrated Pest Management Program and the University of Nebraska, the Center links to wildlife damage control publications at over 40 universities and agencies.

Vantassel, S. 2012. **A Jungle of Information. Pest Control Technology. September. 106, 108-109.** Summarizes resources on wildlife damage management readily available via the Internet as well as provides tips for using search engines more effectively. In addition, Vantassel suggests several print resources useful for wildlife control operators.

White, G. 2006. **President's message. The Wildlife Society, Central Mountains and Plains Newsletter, November 2006: 1-6.** This note describes literature searches and article retrieval using Web of Science, a commercially available literature search program, and Google Scholar, a publicly available search engine for scientific literature.

Journals

Scientific journals primarily publish experimental and descriptive studies across virtually all academic disciplines. Manuscripts submitted to such periodicals are generally reviewed by several experts, with recommendations to accept for publication, accept with changes, or reject; rejection rates are high for many journals. Published papers are indexed by key words or scanned for retrieval by literature search engines. Although papers related to wildlife damage management occur widely in such journals, a few journals are sufficiently specialized that a high proportion of relevant papers are published there. On-line publication is increasingly common. We list a few examples of journals that frequently publish wildlife damage management studies.

Canadian Journal of Zoology

<http://www.nrcresearchpress.com/journal/cjz>

Crop Protection

<https://www.journals.elsevier.com/crop-protection/>

Human-Wildlife Interactions

<https://digitalcommons.usu.edu/hwi/>

Emerging Infectious Diseases <https://wwwnc.cdc.gov/eid/>

International Journal of Pest Management

<https://www.tandfonline.com/loi/ttpm20>

Journal of Applied Ecology

<https://besjournals.onlinelibrary.wiley.com/journal/13652664>

Journal of Chemical Ecology

<https://link.springer.com/journal/10886>

Journal of Wildlife Diseases <https://www.jwildlifedis.org/>

Journal of Wildlife Management

<https://wildlifeonlinelibrary.wiley.com/journal/19372817>

New Zealand Journal of Ecology

<https://newzealandecology.org/nzje>

Oikos <http://www.oikosjournal.org>

Pest Management Science

<https://www.onlinelibrary.wiley.com/journal/15264998>

The American Midland Naturalist

<http://www3.nd.edu/~ammidnat/>

Wildlife Society Bulletin <https://>

wildlife.onlinelibrary.wiley.com/journal/19385463a

Trade Magazines

Trade magazines are periodical publications containing articles written by practitioners, industry representatives, or technical writers. Articles are not peer-reviewed and often have a commercial angle or express views in concordance with the publishing organization. Nevertheless, the authors often provide insights based on extensive experience with techniques to manage wildlife damage. The magazines are useful for reviews of new products or equipment and updates on pending regulations or legislation. Although some trade magazines are independent commercial enterprises, many are published by associations for the benefit of members.

American Trapper <http://www.nationaltrappers.com/americantrapper.html>

The official magazine of the National Trappers Association, an association formed to promote fur harvest recreation, industry, and traditions in the U.S. Articles focus on the association news, political commentary, history of trapping, tools, baits, lures, techniques, traps, and youth programs.

Fur Taker Magazine <http://www.furtakersofamerica.com/magazine.html>

The official magazine of Fur Takers of America, an association dedicated to the harvest of wild furbearers in the U.S. Articles focus on the association news, history of trapping, tools, baits, lures, techniques, and traps.

International Trapper <https://portal.nafa.ca/webcenter/portal/Auction/> or <https://nawfsc.com/>

or North American Fur Auctions – International Trapper, 65 Skyway Avenue, Toronto, Ontario, Canada M9W 6C7. International Trapper

is the official publication of the North American Wild Fur Shippers Council. Since 2006, International Trapper Magazine has been the main communication source for information about the NAWFSC and about current marketing activities of both the Shipper's Council and of North American Fur Auctions. The magazine is available, at a nominal charge, to trappers of North America who ship to NAFA.

Le Coureur des Bois <http://www.ftgq.qc.ca/fr/lecoureurdessbois/coureurdessbois7.html>

The official magazine of the Quebec Trappers Federation and the only trapping magazine published in French in North America.

Pest Control Technology (PCT) <https://>

www.pctonline.com/magazine This magazine centers on the needs of pest control industry technicians. The majority of articles focus on the control of insect species and operational issues including: legal, marketing, and human resources concerns for pest control companies. Articles dealing with vertebrates center on control of commensal rodents and urban birds. There are occasional articles discussing management of other vertebrate species.

Pest Management Professional (PMP) <https://>

www.mypmp.net/ The magazine reports news regarding the industry as well as technical articles related to pest management techniques, product reviews, and company operations. Articles on vertebrate pests focus on commensal rodents and urban birds. Other vertebrate species are discussed occasionally.

Trapper and Predator Caller <https://>

www.trapperpredatorcaller.com/ The oldest monthly tabloid magazine on fur harvesting in the U.S. contains news stories, articles on trapping techniques and tools, as well as state association reports. Unlike other publications, it has a column dedicated to calling coyotes and other furbearing predators.

Trapper's Post <http://www.trapperspost.com/>

Started in 2011, this tabloid-style magazine discusses techniques, tools, news, and state association reports related to the trapping of fur. Articles on nuisance wildlife focus on mammals that can be managed by trapping.

Trapper's World <https://www.trappersworld.com>

Published bi-monthly, Trapper's World contains how-to articles by professional trappers, descriptions of trapline situations, fur market analyses, historical reprints, and extensive advertising by suppliers.

Wildlife Control Technology (WCT) <https://www.wctmagazine.com/>

Since starting in 1994, Wildlife Control Technology is the only magazine dedicated exclusively to the control of nuisance wildlife. Content tends to focus on techniques to remove problem animals, such as trapping, shooting, and direct capture. The magazine is available in print and digital editions on a bi-monthly basis.

Wildlife Professional <https://wildlife.org/publications/>

The Wildlife Professional is published quarterly by The Wildlife Society, but is widely available in academic libraries. It covers the entire field of wildlife management, reporting research, news, and analysis of issues and trends in the wildlife profession. It frequently includes wildlife damage management related material.

Government Documents

Governments at all levels (federal, state/provincial, and local) fund and publish a large amount of research and technical information each year. Many government reports, manuals, and brochures published by individual agencies or the U.S. Government Printing office are sold at cost by the agency or are available for loan from libraries. Some libraries (more than 1,250 nationwide) are designated as U.S. federal depositories for government documents and hold published materials in their collections. Locations of these libraries may be found at <http://catalog.gpo.gov/fdlpdir/FDLPdir.jsp>. Many of the early U.S. Biological Survey publications and publications of the U.S. National Museum of Natural History relate to wildlife damage management. Recent publications by federal or state agencies or their research branches may be of particular interest to wildlife damage managers and are generally available on the Internet.

The Congressional Record and the Federal Register are important government publications that are easily accessible online and often contain information needed by managers. The Congressional Record publishes proceedings of both U.S. legislative branches, as well as speeches, materials inserted by members, and reports or transcripts of hearings. Often the reports of committee hearings that may be a basis of future legislation are of particular interest. The Congressional Record and other legislative reports may be found at <https://www.congress.gov/congressional-record>.

The Federal Register is the official journal of the U. S. government. It provides notices of federal rules or rule changes by regulatory agencies and the dates for comment periods. Information related to federal programs for migratory birds, invasive species, endangered species, and environmental or public health policy implementation is published here. Pesticide and drug registrations related to vertebrate damage control change frequently and the Federal Register provides a means for wildlife damage management practitioners to stay current. The Federal Register is available online at <https://www.federalregister.gov/>. Consult the sections for Canada and Mexico for information related to those countries.

Internet Resources

The development of the Internet has made a vast amount of information available. While the ease of access to information is welcomed, the volume of information can overwhelm even the most stalwart researcher. Enter a few keywords into a search engine and you likely will receive thousands or tens of thousands of results. In addition, the quality of information is not consistent and some of it promotes illegal or potentially dangerous techniques. Fortunately, a few simple changes in how you use a search engine can improve the quality of the results dramatically.

We offer the following tips for using the Internet for research. First, select the search engine appropriate for the content you seek to find. Use standard search engines for products, services, and other commercial services. Use

academic search engines when looking for technical research material. Write out your inquiry in phrase or sentence form. Long search strings can reduce the number of hits substantially. Use specific and descriptive search terms. For example, searching on the phrase “raccoon biology” will be less effective than searching with “raccoon biology and life history in Massachusetts”.

Use technical and scientific terms whenever possible. Technical and scientific terms are unfamiliar to most web developers so using them will increase the likelihood of receiving links to scientifically-based sites. For example, use the scientific name of the species for which you are searching (for example, “*Sciurus carolinensis*” is better than “gray squirrel”). Scientific names help reduce receiving hobby sites, such as “I love squirrels.”

Take advantage of techniques for using “and,” “or,” “not,” and “near” to include or exclude terms in your search. For example, a search using raccoon biology will return pages containing both words. But if you put the phrase raccoon biology in quotes then the search engine only will return pages containing the exact phrase (i.e., Boolean searching).

If you do not receive results from your initial search, broaden the search by reducing the number of search terms or by removing quotation marks.

Search Engines

Search engines are specialized websites that use programs to identify website resources of interest throughout the Internet. Use of a search engine typically returns a list of numerous websites of potential interest. Since the Internet is so vast, careful consideration of your search strategy is essential for producing relevant results. For example, searches may be restricted to search text, scientific journals, images, videos, finance sites, books, or news. Some search engines offer automatic translation of websites from other languages to English.

Although there are numerous search engines currently available, a few account for most of the Internet use. Some that are helpful in finding information related to wildlife damage management and that are available at no cost include:

Google <https://www.google.com>

Google Scholar <https://scholar.google.com/>

Google Books <https://books.google.com>

Bing <https://www.bing.com>

Microsoft Academic Research

<https://www.microsoft.com/en-us/research/project/academic>

YouTube <https://www.youtube.com>

Specialized commercial search engines useful in finding scientific literature related to wildlife damage management, as well as in-house search engines managed by organizations or institutions, may be available at no cost to organization members, students, library patrons, or others; otherwise, they are available for a nominal charge. Two that are useful for finding scientific information on wildlife damage management:

Web of Science

<https://clarivate.com/webofsciencigroup/>

Wildlife and Ecological Studies Worldwide <https://www.ebscohost.com/products/research-databases/wildlife-ecology-studies-worldwide>

Portals

Portals are sites that specialize in a specific field and provide links, or summarize information from a variety of sources. Unlike most search engines that use machines and complex models to identify and categorize sites, portals rely on manual indexing of reference materials. What portals lack in breadth, they more than make up for in quality because sites and information are carefully examined before being listed. Some useful portals include:

Agriculture Network Information Collaborative (AgNIC)

<https://agnic.org> The Agriculture Network Information Collaborative (AgNIC) is a voluntary alliance of members based on the concept of “centers of excellence.” The member institutions are dedicated to enhancing collective

information and services among the members and their partners for all those seeking agricultural information over the Internet. Search “Wildlife Damage Management” to access information on the various aspects of problems, including control, economics, animal welfare, and human dimensions.

Biodiversity Information Serving Our Nation (BISON)

<https://bison.usgs.gov/#home> BISON is an acronym for Biodiversity Information Serving Our Nation. Created by the U.S. Geological Survey, BISON is an information system that allows users to access, explore, and download U.S. species occurrence data from participating data providers. In addition to location data, BISON allows users to apply various overlays to help put the data into environmental and political contexts.

Center for Human-Wildlife Conflict Resolution

<https://www.humanwildlife.cmi.vt.edu/> Though its primary audience consists of residents of Virginia, the site contains a list of useful links to various aspects of wildlife damage management issues in a simple format.

Global Biodiversity Information Facility (GBIF)

<https://www.gbif.org> The Global Biodiversity Information Facility is a multi-national organization headquartered in Copenhagen, Denmark that compiles scientific information on biodiversity available through the Internet, using georeferencing and geographic information systems. Distribution data for plants and animals, including range maps based on specimen holdings in major international museums, is particularly useful.

Internet Center for Wildlife Damage Management (ICWDM)

<http://www.icwdm.com> Created in 1996, the Internet Center for Wildlife Damage Management provides information on the identification, prevention, and mitigation of damage by vertebrates in the U.S. It provides links to a variety of informational resources and provides a webmaster that will answer technical questions.

PESTWEB <http://www.pestweb.com> PestWeb, operated by Univar, specializes in providing Internet links to pest control associations, education resources, government resources, manufacturers, distributors, industry news, and products.

University of Nebraska-Lincoln Digital Commons <http://digitalcommons.unl.edu/icwdm/> The Digital Commons is a searchable repository of hard-to-find publications related to wildlife damage management compiled by the Internet Center for Wildlife Damage Management. It contains over 5,500 documents and continues to grow as more material is added. Publications include proceedings from the Vertebrate Pest Conference, the Wildlife Damage Management Conference, newsletters, and more.

Bulletin Boards and Listservs

Bulletin boards are Internet sites where participants can post questions and receive responses from others interested in the same topic. Typically, the sites are not monitored for the accuracy of the information, instead relying on crowd sourcing and peer-pressure. Listservs are electronic mailing list programs that allow a writer to send an e-mail to everyone on the list. Some listservs require submissions to be approved prior to being sent to the group, while others allow postings to be made without restriction. The popularity of listservs has fallen as information became easier to locate through search engines; however, we provide addresses for several still in use. Interest groups have generally migrated to social media sites such as Facebook. Facebook has many wildlife control related groups that are free to join. Search Facebook using keywords, such as wildlife control, trapping, pest control, wildlife control operator, bird control, etc.

Trapperman <http://trapperman.com/> This is one of the longest running bulletin boards specializing in traps and trapping. Along with sections related to trapping and fur harvesting questions, the site has a section dedicated to animal damage control. Visitors are warned that sometimes comments can appear unseemly and suggestions occasionally are illegal and dangerous. Nevertheless, some of the visitors are very competent trappers, bait makers, and trap manufacturers.

Sullivan's Trap Line <http://sullivanline.com/forums/ubbthreads.php/ubb/cfrm> This bulletin board, hosted by fur trapping expert Hal Sullivan, is somewhat similar to Trapperman.com in attracting broad discussion topics by trappers. It also provides access to a catalog of Sullivan's numerous articles and products.

Image Resources

Images provide important visual support for understanding the impact of wildlife damage as well as the tools used to manage those impacts. The following sites contain image databases that may be useful for obtaining images related to wildlife damage management. We have selected sites with minimal copyright restrictions.

Centers for Disease Control (CDC) Public Health Image Library <https://phil.cdc.gov/default.aspx> This is the site to visit for images related to zoonotic diseases.

Center for Invasive Species and Ecosystem Health <https://www.bugwood.org/> Although this site primarily focuses on plant and invertebrate species, it does contain a rather large database of photos on vertebrates and their damage.

United States Fish and Wildlife Service (USFWS) National Digital Library <https://digitalmedia.fws.gov/> This government site provides a rather large collection of images of animals in the U.S.

Wikimedia Commons https://commons.wikimedia.org/wiki/Main_Page This site is a growing, open-use image database with a wide variety of photos freely available.

The Library of Congress' Science Reference Services <https://www.loc.gov/rr/scitech/selected-internet/imagesources.html#agriculture> provides an extensive list of links to image resources of a scientific nature that may be useful as well.

U.S. Federal Agencies

Many federal agencies have either regulatory or land management functions and deal with problems caused by overabundant wildlife, regulatory actions, or options affecting their management. Federal agencies can be accessed through the U. S. government portal (<https://www.usa.gov/agencies>). A few agencies or units have activities or resources closely related to wildlife damage management that may be very useful to practitioners.

Animal and Plant Health Inspection Service, Wildlife Services <https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage> The U.S. Department of Agriculture's Wildlife Services program is a unique federal wildlife management program. It provides federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to co-exist. Wildlife Services has no regulatory or land management responsibilities, but has broad legislative authority for hands-on wildlife management in cooperative programs with landowners, private entities, states, other federal agencies, or other countries. The program is involved in a wide variety of activities ranging from the management of invasive species, wildlife diseases, crop pests, and livestock predators, to reducing wildlife hazards to aircraft.

Centers for Disease Control and Prevention (CDC) <https://www.cdc.gov> The Centers for Disease Control and Prevention or CDC develops expertise, information, and tools needed to protect public health and safety through health research, promotion, and preparedness to prevent or treat disease, injury, and disability, and to address emerging public health threats. Valuable information for wildlife vector control managers is available online or through publications from the various centers.

Environmental Protection Agency (EPA) <https://www.epa.gov> The EPA is responsible for registering and regulating pesticide use under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and for investigating and enforcing violations. The agency website contains a significant number of publications, reports, and regulatory documents related to pesticides and their use.

Fish and Wildlife Service (USFWS) <https://www.fws.gov/> The U.S. Fish and Wildlife Service is responsible for protecting and conserving wildlife species native to the U.S. and manages over 300 million acres of lands and waters. The Service oversees and enforces the Endangered Species Act, the Migratory Bird Treaty Act, and other legislative mandates related to wildlife management. In addition, the Service maintains a digital library containing images, videos, audio files, and documents related to wildlife species and their management in the U. S. and publishes scientific journals that sometimes include papers related to wildlife damage management.

Forest Service (USFS) <https://www.fs.fed.us/> The Forest Service manages 193 million acres of forest and grasslands in the U.S. The service is mandated to protect and manage land to serve natural resource and recreational needs. In some parts of the country, grazing and timber production are important Forest Service activities. Wildlife and wildlife damage management actions conducted by the agency or cooperators and efforts to provide public information result in considerable materials available through the agency's website.

Geologic Survey (USGS) <https://www.usgs.gov/> In 1996, the Department of Interior consolidated its science and research activities, including those related to migratory birds, endangered and threatened species, and invasive species under the U.S. Geological Survey. The USGS website contains high quality maps of the U. S., and data on wildlife diseases, climate, natural resources and both invasive and native species. Sections of the site with wildlife damage management materials are somewhat difficult to find in name searches because the agency tends to reorganize frequently.

National Park Service (NPS) <http://www.nps.gov> Since 1916, the National Park Service has been entrusted with the care of our national parks. With the help of volunteers and partners, it safeguards these special places and shares their stories with more than 330 million visitors every year. The NPS often regulates access to areas to protect wildlife, prohibits the feeding of wildlife, sets garbage regulations, removes problem animals, and controls overabundant wildlife deemed harmful to the natural environment.

National Wildlife Research Center (NWRC) <https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc> The National Wildlife Research Center is the research arm of USDA's Wildlife Services program. The NWRC researches materials, methods, and programs to protect agricultural and forest crops, livestock, aircraft, endangered species, natural resources, and people from wildlife damage or zoonotic diseases. In addition to providing free, online access to printable copies of research publications, the Center maintains a specialized collection of wildlife damage management books, papers, and unpublished reports that can be accessed through a searchable library catalog.

Natural Resources Conservation Service (NRCS) <https://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/> With its origin in the 1930's as the Soil Conservation Service, the Natural Resources Conservation Service (NRCS) draws on a long history of helping people help the land. NRCS works in close partnerships with farmers and ranchers, local and state governments, and other federal agencies to maintain healthy and productive working landscapes. NRCS uses science-based technology, tools, and applications to support landowners, land operators, and others through conservation planning and assistance to benefit the soil, water, air, plants, and animals for productive lands and healthy ecosystems. Extensive information, resource materials, tools and applications can be accessed through links provided on the website.

U.S. State Fish and Wildlife Agencies

States have the primary responsibility for enacting and enforcing rules related to the management of resident wildlife. Each state, therefore, has an agency, commission, or division responsible for the oversight of native species. The regulations governing wildlife for each state can be found at the respective sites listed below. Some states have additional information on management of human-wildlife conflicts. State wildlife officials also are available to answers questions about the application of regulations as well as wildlife biology and behavior.

Alaska: <https://www.adfg.alaska.gov/>

Alabama: <https://www.outdooralabama.com/>

Arkansas: <https://www.agfc.com/en/>

Arizona: <https://www.azgfd.com/>

California: <https://www.wildlife.ca.gov/>

Colorado: <https://cpw.state.co.us/>

Connecticut: <https://www.ct.gov/deep/site/default.asp>

Delaware: <https://dnrec.alpha.delaware.gov/fish-wildlife/>

Florida: <https://myfwc.com/>

Georgia: <https://georgiawildlife.com/>

Hawaii: <http://dlnr.hawaii.gov/wildlife/>

Idaho: <https://idfg.idaho.gov/>

Illinois: <https://www.dnr.illinois.gov/>

Indiana: <https://www.in.gov/dnr/>

Iowa: <https://www.iowadnr.gov/>

Kansas: <https://ksoutdoors.com/>

Kentucky: <https://fw.ky.gov/>

Louisiana: <http://www.wlf.louisiana.gov/>

Maine: <https://www.maine.gov/ifw/>

Maryland: <http://dnr.maryland.gov/>

Massachusetts: <https://www.mass.gov/orgs/division-of-fisheries-and-wildlife>

Michigan: <https://www.michigan.gov/dnr/>

Minnesota: <https://www.dnr.state.mn.us/>

Mississippi: <https://www.mdwfp.com/>

Missouri: <https://mdc.mo.gov/>

Montana: <http://fwp.mt.gov/>

Nebraska: <http://outdoornebraska.gov/>

Nevada: <http://www.ndow.org/>

New Hampshire: <https://www.wildlife.state.nh.us/>

New Jersey: <https://www.state.nj.us/dep/fgw>

New Mexico: <http://www.wildlife.state.nm.us/>

New York: <https://www.dec.ny.gov/>

North Carolina: <https://www.ncwildlife.org/>

North Dakota: <https://gf.nd.gov/>

Ohio: <http://www2.ohiodnr.gov/>

Oklahoma: <https://www.wildlifedepartment.com/>

Oregon: <https://dfw.state.or.us/>

Pennsylvania: <https://www.pgc.pa.gov/Pages/default.aspx>

Rhode Island: <http://www.dem.ri.gov/programs/naturalresources/>

South Carolina: <http://www.dnr.sc.gov/>

South Dakota: <https://gfp.sd.gov/>

Tennessee: <https://www.tn.gov/twra/>

Texas: <https://tpwd.texas.gov/>

Utah: <https://wildlife.utah.gov/>

Vermont: <https://vtfishandwildlife.com/>

Virginia: <https://www.dgif.virginia.gov/>

Washington: <https://wdfw.wa.gov/>

West Virginia: <http://www.wvdnr.gov/>

Wisconsin: <https://dnr.wi.gov/>

Wyoming: <https://wgfd.wyo.gov/>

U.S. State Pesticide Boards

Although the U.S. Environmental Protection Agency registers and regulates the use of pesticides, states may enact licensing requirements or additional restrictions for the use of particular pesticides or develop individual registrations to address special local needs. Furthermore, states are responsible for licensing and training guidelines for certifying applicators' use of restricted pesticides.

Alabama: <http://www.agi.alabama.gov/divisions/pesticide-management>

Alaska: <http://dec.alaska.gov/>

Arkansas: <https://www.agriculture.arkansas.gov/pesticide>

Arizona: <https://opm.azda.gov/>

California: <https://www.cdpr.ca.gov/>

Colorado: <https://www.colorado.gov/agmain>

Connecticut: <https://www.ct.gov/deep/site/default.asp>

Delaware: <https://agriculture.delaware.gov/>

District of Columbia: <https://doee.dc.gov/>

Florida: <https://www.freshfromflorida.com/#Consumer-Resources>

Georgia: <http://agr.georgia.gov/>

Hawaii: <http://hdoa.hawaii.gov/>

Idaho: <https://agri.idaho.gov/main/>

Illinois: <https://www2.illinois.gov/sites/agr/Pesticides/Pages/default.aspx>

Indiana: <https://www.oisc.purdue.edu/pesticide/index.html>

Iowa: <https://iowaagriculture.gov/forms-and-licensing>

Kansas: <https://agriculture.ks.gov/>

Kentucky: <http://www.kyagr.com/licensing/>

Louisiana: <http://www.ldaf.state.la.us/ldaf-programs/>

Maine: <https://www.maine.gov/dacf/php/pesticides/index.shtml>

Maryland: <https://mda.maryland.gov/Pages/default.aspx>

Massachusetts: <https://www.mass.gov/pesticide-examination-and-licensing>

Michigan: <https://www.michigan.gov/mdard>

Minnesota: <https://www.mda.state.mn.us/>

Mississippi: <https://www.mdac.ms.gov/bureaus-departments/plant-industry/pesticide-program/>

Missouri: <https://agriculture.mo.gov/>

Montana: <https://agr.mt.gov/>

Nebraska: <http://www.nda.nebraska.gov/>

Nevada: <http://agri.nv.gov/>

New Hampshire: <https://www.agriculture.nh.gov/>

New Jersey: <https://www.state.nj.us/dep/>

New Mexico: <http://www.nmda.nmsu.edu/>

New York: <http://www.dec.ny.gov/permits/209.html>

North Carolina: <https://www.nc.gov/agencies/agriculture>

North Dakota: <https://www.nd.gov/ndda/>

Oklahoma: <http://www.ag.ok.gov/cps/pest.htm>

Ohio: <https://agri.ohio.gov/wps/portal/gov/oda/divisions/plant-health/pesticides/>

Oregon: <https://www.oregon.gov/oda/programs/Pesticides/Pages/AboutPesticides.aspx>

Pennsylvania: <https://www.agriculture.pa.gov/Pages/default.aspx>

Rhode Island: <http://www.dem.ri.gov/programs/agriculture/>

South Carolina: <https://www.clemson.edu/public/regulatory/pesticide-regulation/index.html>

South Dakota: <http://sdda.sd.gov/>

Tennessee: <https://www.tn.gov/agriculture.html>

Texas: <https://texasagriculture.gov/>

Utah: <http://ag.utah.gov/farmers/plants-industry/pesticides/>

Vermont: <https://agriculture.vermont.gov/>

Virginia: <http://www.vdacs.virginia.gov/>

Washington: <https://agr.wa.gov/departments/pesticides-and-fertilizers>

West Virginia: <https://agriculture.wv.gov/divisions/regulatoryandenvironmental/pesticides/Pages/default.aspx>

Wisconsin: <https://datcp.wi.gov/Pages/Homepage.aspx>

Wyoming: <http://wyagric.state.wy.us/online-training/236>

Canada—Federal, Provincial and Private Organizations

Animal depredation control in Canada is governed by provincial or territorial jurisdictions and rules; regulations vary from province to province. Typically, pertinent regulations occur under official hunting and trapping laws. For wildlife control outside of official seasons, or for non-hunted species, special “depredation” permits are required in some cases. Currently, many provinces, such as British Columbia and Quebec, are trying to formalize some rules, or guidelines, for dealing with animal damage control. At

present, only a few provinces have specific guidelines or codes of ethics, and the hub for information usually is either the provincial or territorial trappers association, or the local government (under the appropriate department: Natural Resources, Environment, or Fish and Wildlife). Agricultural issues, especially the use of pesticides, are governed provincially via Departments of Agriculture.

Canada has a highly developed regulatory system, particularly in the area of pesticide use. Their organization of executive agencies is similar to that of the U.S. Here, ministries are listed starting with those governing management of wildlife followed by those that handle pesticide regulation.

Federal

Environment and Climate Change Canada <https://www.canada.ca/en/environment-climate-change.html>

This agency deals with migratory birds, biodiversity, species at risk, and CITES issues.

Fisheries and Oceans Canada <http://www.dfo-mpo.gc.ca/index-eng.htm> Fisheries and Oceans Canada oversees all issues related to saltwater fish and wildlife (including polar bears).

Agriculture and Agri-Food Canada <http://www5.agr.gc.ca/eng/home/?id=1395690825741> Agriculture and Agri-Food Canada is responsible for all matters pertaining to agriculture and agricultural land use.

Health Canada Pest Management Regulatory Agency (PMRA) <https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management.html> The Health Canada Pest Management Regulatory Agency (PMRA) is responsible for pesticide regulation in Canada. Created in 1995, this branch of Health Canada consolidates the resources and responsibilities for pest management regulation.

Other National Wildlife-Related Organizations

Canadian National Trappers Alliance
<http://www.trapper.ca>

Fur Institute of Canada <https://fur.ca/>

Canadian Wildlife Federation

<http://www.cwf-fcf.org/en/>

Canadian Pest Management Association

<http://pestworldcanada.net/>

*Provinces, Territories and Associations***Alberta**

Alberta Trappers Association

<http://www.albertatrappers.com/>

Alberta Conservation Association

<https://www.ab-conservation.com/>

Hunting, Fishing and Trapping Regulations

<http://www.albertaregulations.ca/>

Environment <https://www.alberta.ca/environment-natural-resources.aspx>

British Columbia

Ministry of Forests, Lands, and Natural Resource Operations and Rural Development

<https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/forests-lands-natural-resource-operations-and-rural-development>

Ministry of Environment & Climate Change Strategy

<https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/environment-climate-change>

BC Trappers Association <http://bctrappers.bc.ca/>

Manitoba

Sustainable Development

<https://www.gov.mb.ca/sd/index.html>

Agriculture <https://www.gov.mb.ca/agriculture/index.html>

Manitoba Trappers Association

<http://www.manibotrappers.com/>

New Brunswick

Natural Resources https://www2.gnb.ca/content/gnb/en/departments/erd/natural_resources.html

Environment and Local Government <https://www2.gnb.ca/content/gnb/en/departments/elg.html>

New Brunswick Trappers and Fur Harvesters Association

<http://www.nbtrappers.ca/>

Newfoundland/Labrador

Department of Fisheries and Land Resources

<https://www.flr.gov.nl.ca/>

Dept. of Municipal Affairs and Environment (pesticides)

https://www.mae.gov.nl.ca/env_protection/pesticides/index.html

Newfoundland and Labrador's Trappers Association

<https://www.nltrappers.com/>

Newfoundland and Labrador Department of Natural Resources

<https://www.nr.gov.nl.ca/nr/>

Northwest Territories

Department of Environment and Natural Resources

<https://www.enr.gov.nt.ca/en>

Nova Scotia

Trappers Association of Nova Scotia

<http://trappersassociationofnovascotia.ca/>

Department of Lands and Forestry

<https://novascotia.ca/natr/>

Department of Agriculture <https://novascotia.ca/agri/>

Nunavut

Nunavut Hunters and Trappers Association Baker Lake, NU XOC OAO, Canada

Nunavut Department of Environment

<https://gov.nu.ca/environment>

Ontario

Ontario Fur Managers Federation

<https://furmanagers.com/>

Ontario Ministry of Natural Resources and Forestry

<https://www.ontario.ca/page/ministry-natural-resources-and-forestry>

Ontario Federation of Agriculture <https://ofa.on.ca/>

Ontario Federation of Anglers and Hunters

<https://www.ofah.org/>

Structural Pest Management Association of Ontario

<https://spmao.ca/>

Prince Edward Island

Prince Edward Island Trappers Association (no website)

PEI Department of Environment, Water and Climate

Change <https://www.princeedwardisland.ca/en/topic/communities-land-and-environment>

Quebec

Quebec Trappers Federation (Fédération des Trappeurs Gestionnaires du Québec)

http://www.ftgq.qc.ca/fr/qui/index_ang.htm

Ministère du Développement Durable, de la Lutte contre les changements climatiques

<http://www.environnement.gouv.qc.ca/>

Ministère de l'Agriculture, des pêcheries et de l'Alimentation

<https://www.mapaq.gouv.qc.ca/fr/Pages/Accueil.aspx>

Saskatchewan

Saskatchewan Trappers Association

<http://saskatchewantrappers.com/>

Saskatchewan Ministry of Environment

<http://www.environment.gov.sk.ca/>

Saskatchewan Ministry of Agriculture <https://>

www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers

Yukon

Yukon Fish and Game Association

<http://www.yukonfga.ca/>

Yukon Trappers Association <http://www.yukonfga.ca/support/yukon-trappers-association/>

Yukon Department of Environment <http://>

www.env.gov.yk.ca/

Libraries

Libraries continue to be an excellent source of primary information. Research libraries at universities subscribe to scientific journals and proprietary search engines, generally allowing their use by local community members at no cost. Current periodical sections provide means to keep abreast of current developments in wildlife damage management. Some larger libraries are designated as repositories for government documents and have professional librarians available to assist with their access.

The development of e-mail and Internet services has enabled even small local libraries to quickly obtain obscure books and other documents by interlibrary loans. Larger public libraries and college libraries generally subscribe to numerous periodicals, including trade magazines.

Associations and Societies

Professional associations and societies are organizations established to further the interests of their members. Societies have a more academic focus, often publishing peer-reviewed journals and establishing standards of practice for their respective fields. Associations are often trade or industry oriented and may publish trade magazines. There are a number of such organizations with interests closely tied to wildlife damage management. A number of other organizations publish popular journals or

magazines aimed at the general public. The professional organizations generally provide training opportunities through annual meetings or conventions, workshops, and networking. Some of the organizations also engage in political activities aimed at supporting or opposing legislation or regulations aligned to the interests of their memberships. Some of the organizations related to wildlife damage management include:

Association of Fish and Wildlife Agencies (AFWA)

<https://www.fishwildlife.org/> The Association of Fish and Wildlife Agencies represents the interests of North America's fish and wildlife agencies to advance sound, science-based management of fish and wildlife resources and their habitats. Using a series of committees that meet twice annually, the association develops and advances policies for wildlife management and provides extensive resources and information for member agencies and the public. The furbearer management section of the website includes resource materials and reports related to Best Management Practices for Trapping (<https://www.fishwildlife.org/afwa-inspires/furbearer-management>).

Fur Takers of America (FTA) <http://www.furtakersofamerica.com/>

The association works to enhance the opportunities and skill levels of fur trappers. In addition to an annual convention, the FTA operates the weeklong, Fur Takers College, originally established in association with Purdue University.

National Pest Management Association (NPMA) <https://npmapestworld.org/> and <https://www.pestworld.org/> The organization serves the interests of pest management companies in the U.S. and around the world. Although much of the commercial activity of association members relates to management of insects pests, many companies also work with problems caused by commensal rodents, urban birds, and other nuisance wildlife species.

National Trappers Association (NTA) <http://www.nationaltrappers.com/>

The association represents the interests of trappers and fur harvesters in state, national, and international forums to foster healthy furbearer populations and to protect the public's right to harvest fur as a renewable natural resource through education and

lobbying efforts. The association also supports extensive training and scholarship programs closely tied to cooperating state trapper associations.

National Wildlife Control Operators Association (NWCOA)

<https://www.nwcoa.com> This is the only organization in North America dedicated exclusively to the interests of commercial wildlife control operators. Its goals include improving the professionalism of the industry and encouraging enactment of reasonable regulations.

The Wildlife Society (TWS)-Wildlife Damage Management Working Group

<https://wildlife.org/wdmwg/> The group assists in exchanging information on wildlife damage management among academics, professionals, and interested individuals. The group sponsors the Wildlife Damage Management Conference on odd numbered years.

Many groups have state or regional associations and task-oriented working groups for fur trappers, pest control and wildlife control operators, and wildlife damage professionals that can be accessed through the national associations. These local groups can be very helpful for networking and keeping abreast of local issues important to those involved in wildlife damage management in that state.

Conferences and Workshops

There are relatively few meetings dedicated exclusively to wildlife damage management. Conferences provide attendees with the opportunity to learn about new research and exchange ideas, typically in a lecture setting. Workshops, on the other hand, moderate lecture-style learning with opportunities for hands-on experiences.

Workshops offered by the **National Wildlife Control Operators Association** (<https://nwcoa.com>) include:

- The Bat Standards II, a 2-day workshop available for those who have passed level 1. Attendees learn how to

estimate costs of bat exclusion jobs and perform exclusion at a designated site.

- The Goose Academy, a 2-day workshop where individuals become certified in the management of damage caused by Canada geese.
- The Shooting Academy, a 2-day workshop where attendees learn how to use firearms to remove wildlife in sensitive or populated areas. Those who meet accuracy standards become certified.

National Wildlife Control Training Program <http://training.nwctp.com/> The program offers wildlife control training online and via published manuals. Several states accept the training as fulfilling prerequisites for licensing.

Vertebrate Pest Conference <http://www.vpconference.org/> The conference is held during even years in California or a nearby state. Managed by the Vertebrate Pest Council since 1962, it is the longest running wildlife damage management conference in the U.S. Although this conference is designed to serve the continuing education requirements of California's state, local, and private vertebrate pest management professionals, the programs include topics that apply worldwide. The conference attracts many international speakers and attendees, particularly from Australia, New Zealand, and Japan.

Wildlife Damage Management Conference <https://wildlife.org/wdmwg/> This conference, produced by The Wildlife Society's Wildlife Damage Management Working Group, is held in odd years in states other than California. Presentations range from highly technical research to human perspectives on animals. Attendees generally consist of academics and government research and operations personnel. Recently, efforts have been made to encourage attendance by private pest control operators.

Wildlife Expo <http://www.nwcoa.com> The Wildlife Expo is operated by the National Wildlife Control Operators Association (NWCOA) in cooperation with the National Pest Management Association (NPMA). The conference focuses on commercial wildlife control operators' interests in learning new business tactics and wildlife control techniques.

Other Resources

Management of wildlife damage does not wait until the ideal control method has been confirmed in a peer-reviewed journal. Trappers and wildlife control operators frequently develop effective methods based on ingenuity and immediate needs. Typically, they don't publish these techniques through established publishers, but may describe them in booklets, brochures, or videos. To locate such materials, consult trapping supply house catalogs that are usually available online. Some such materials are reviewed in a regular column of *Fur Taker Magazine* and at Stephen Vantassel's website, <https://wildlifecontrolconsultant.com>. Personal training is an important continuing activity for all individuals engaged in any aspect of wildlife damage management. A good approach for many has been to work with experienced biologists, supervisors, or private trappers.

Conclusion

In the past few decades, there has been a remarkable increase in the volume and quality of information related to wildlife damage management. The instantaneousness and accessibility of the Internet and the development of online digital publishing have enhanced the distribution of information to broad audiences while often making the quality and the sources sometimes difficult to determine. In addition, the availability of wildlife damage management information continues to be hampered by its broad involvement of many disciplines. Until wildlife damage management matures as a unique and separate professional field and is no longer perceived simply as pest control, trapping, or wildlife control, researchers, managers, and practitioners must search multiple decentralized sources to find essential information. This publication synthesizes sources of information on wildlife damage management in North America and provides a guide for practitioners across a variety of wildlife, agriculture, public health, and structural pest control disciplines to access common sources of technical and practical information.

Acknowledgements

Figure 1. Photo by USDA-APHIS-Wildlife Services

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Glossary

Grey literature: Materials and research produced by organizations outside of the traditional commercial or academic publishing and distribution channels. Common grey literature publication types include reports, working papers, government documents, white papers and evaluations.

Listserv: An application that distributes messages to subscribers on an electronic mailing list.

Peer-reviewed: Articles that are written by experts and reviewed by several other experts in the field before the article is published to ensure the article's quality.

Portal: A website or web page providing access or links to other sites.

Key Words

Animal control, Nuisance wildlife, Wildlife damage management

Disclaimer

Wildlife can threaten the health and safety of you and others in the area. Use of damage prevention and control methods also may pose risks to humans, pets, livestock, other non-target animals, and the environment. Be aware of the risks and take steps to reduce or eliminate those risks.

Some methods mentioned in this document may not be legal, permitted, or appropriate in your area. Read and follow all pesticide label recommendations and local requirements. Check with personnel from your state wildlife agency and local officials to determine if methods are acceptable and allowed.

Mention of any products, trademarks, or brand names does not constitute endorsement, nor does omission constitute criticism.

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