

The Chemical and Related Technical Literature of Wildlife Conservation*

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Received August 4, 1967

This paper reports the availability of chemical and related facts in wildlife conservation research. It also serves literature chemists, information scientists, and librarians as a guide to information in a relatively new field of scientific endeavor.

There is an ever increasing interest among chemists in the basic and applied research being done in America in the field of natural resources conservation. This interest can be further stimulated by knowledge of chemical facts contributed by a technical literature generally considered "exotic" by chemists. In this paper we treat the source of this literature as related to research conducted on migratory wildlife as one segment of the over-all fish and wildlife conservation research programs carried out by Federal and State agencies. The Bureau of Sport Fisheries and Wildlife under the Department of the Interior has the major responsibilities for research, management, and information on such programs as assigned by Congress.

Historically, the first known records, in the broad sense, of technical literature dealing with fish and wildlife species are pictured on the walls of the ancient temples of Egypt and Mesopotamia. Even our own ACS symbol, the Phoenix, is a lineal, philosophical descendent from primeval origins. Three unpublished papers of limited scope dealing with wildlife conservation have already been presented at national meetings of the American Chemical Society (1-3).

The chemical facts significant in migratory wildlife research and management are found in various natural resources' publications ranging from those issued internationally and nationally, to those of regional and local origin. Most of these papers present primarily botanical and zoological approaches to wildlife management problems, but frequently large sections are devoted to the technical methods used in the chemical laboratory for ascertaining the necessary chemical facts.

The ACS journals—e.g., *Analytical Chemistry*, *Journal of Agricultural and Food Chemistry*, and of course, *Chemical Abstracts*, as well as other well-known periodicals like the *Journal of the Association of Official Analytical Chemists*, *Chemist-Analyst*, and the *Journal of the American Water Works Association* are used as a source of applicable new or standard methods. The information available in the recently initiated journal, *Environmental Science and Technology*, is also applicable to wildlife conservation needs (4-5).

*Presented in part before the Division of Chemical Literature, 153rd Meeting, ACS, Miami Beach, Fla., April 1967.

A brief description of 14 periodicals follows. Table I summarizes their frequency, approximate annual pages, source, and annual cost. These titles were especially chosen from the others available because they represent a good over-all view of the type of chemical and related technical information available in migratory wildlife conservation programs at the present time. The individual papers range from philosophical discussions of guidelines for fundamental conservation research to techniques actually employed in the laboratory and the field. The first group includes some of international and national scope.

Chemically significant articles in *Auk* range from the determination of the origin of iron stains on waterfowl feathers (6) to the electrophoresis of white protein of bird eggs (7-8). Other technical article types describe the effect of salt intake on the salt gland of ducks (9), and the use of radioactive iodine in the measurement of the thyroid activity in birds (10). Unexpected field discoveries are also reported (11).

The *Bulletin of the Wildlife Disease Association* reports field (12-13) and laboratory investigations (14-15).

Ecology generally deals with the more fundamental aspects of conservation, and contains papers from those concerned with the detailed characterizations of wildlife habitats (16-20) to bird foods (21-23) and general avian biochemical factors (24) or field techniques (25).

Fish and Wildlife Service Research Reports and *Special Scientific Reports* are irregular serials of the U. S. Department of the Interior. Their technical material varies from the detailed studies of water quality determination (26-27) to the pertinent botanical, zoological, and chemical factors of wildlife food quality (28-29). Also pesticides are of interest (30), and field studies are well covered (31).

Ibis contains articles of rather interesting basic chemical aspects of birds. Here we find biochemical methods applied to taxonomy (32), investigations of pigmentation (33), and nutrition (34).

The *Journal of Wildlife Management* contains much data from the natural and wildlife resources chemical laboratory. Field investigations conducted throughout the world are published here. Subjects of papers vary from aspects of nutrition (35-36) or habitat (37-39) to biochemical

determinations (40-42), and varied technological studies ranging from field equipment applications (43-44) to applied pharmacological methods (45-46). Toxicity studies are especially well covered in this leading conservation journal (47-51). Animal control methodology is also reported (52-53).

Good articles discussing fundamental research with comprehensive bibliographies are found in the *Proceedings of the International Ornithological Congress* (54-55). The Congress meets about every 4 years.

The Transactions of the North American Wildlife and Natural Resources Conference serves as an excellent source for outlines of national (56-58) and regional (59-60) conservation problems. Also significant chemical and other technical data is published ranging from research concerning nutritional studies (61-64), toxicological aspects (65-68), habitats (69-71), and repellents (72). Occasionally wildlife research is also reported during special conferences (73-74) and in general conservation or scientific journals (75-76).

Next we have a selection of several publications stressing regional and local natural resources problems and investigations.

The nutrition (77-78) and toxicology (79-80) of waterfowl and other wildlife in the state is reported in detail in *California Fish and Game*.

The *New York Fish and Game Journal* contains articles ranging from habitat studies dealing with biochemical changes in artificial marshes (81-82) to the pollution of water environments (83).

The Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners publish facts ranging from chemical field management techniques (84) and nutrition (85) to toxicological investigations (86).

Somewhat more local in nature is the *Proceedings of the North Dakota Academy of Science*. Similar proceedings are published by most state academies of science. Here wildlife foods (87-88) are reported as well as environments (89-90) and other waterfowl scientific problems (91). Similar proceedings or transactions of course are published by most state academies of science. Their importance as original sources of reported research on wildlife conservation and management will increase in the future. Papers vary from practical management studies (92-93) to more fundamental investigations (94-96).

A technical information service little known outside of the wildlife conservation field is *Wildlife Review*, and its comprehensive indices, *Wildlife Abstracts*. This compact yet concise quarterly abstracts not only English language wildlife conservation research, but also many original papers in foreign languages. In order to present a better understanding of its comprehensive nature, a partial list of the various divisions and sections covering abstracted scientific papers is given in Table II.

SUMMARY

Chemical facts developed in the wildlife research and management field are available in a variety of publications.

Table I. List of Periodicals

Title	Frequency	Approx. Annual Pages	Source	Annual Cost
<i>Auk</i>	quarterly	700	American Ornithologists' Union P.O. Box 23447, Anchorage, Ky. 40223	\$6
<i>Bulletin of the Wildlife Disease Association</i>	quarterly	100	P.O. Box 886, Ames, Iowa 50010	\$5
<i>Ecology</i>	quarterly	900	Ecological Society of America, Duke University Press, Box 6697, College Station, Durham, N. C. 27708	\$12
<i>Fish and Wildlife Service Research Reports; Special Scientific Reports—Wildlife</i>	periodic	varies	Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.	Varies
<i>Ibis</i>	quarterly	600	Academic Press, 111 Fifth Ave., New York, N. Y. 10003	\$16.20
<i>Journal of Wildlife Management</i>	quarterly	1000	The Wildlife Society, Suite S-176, 3900 Wisconsin Ave., N. W., Washington, D. C. 20016	\$15
<i>Proceedings of the International Ornithological Congress</i>	irregular	1200	Same as the <i>Auk</i>	\$20
<i>Transactions of the North American Wildlife and Natural Resources Conference</i>	annual	500	Wildlife Management Institute, Wire Building, Washington 5, D. C.	\$4.50
<i>California Fish and Game</i>	quarterly	300	Office of Procurement, Documents Section P.O. Box 1612, Sacramento, Calif. 95807	\$2
<i>New York Fish and Game Journal</i>	semi-annual	200	New York Conservation Department, Albany 1, N. Y.	\$2
<i>Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners</i>	annual	500	N. C. Game and Fish Commission, Raleigh, N. C.	\$5
<i>Proceedings of the North Dakota Academy of Science</i>	annual	200	N. D. Academy of Science, University of North Dakota, Grand Forks, N. D.	\$3
<i>Wildlife Review—Wildlife Abstracts</i>	quarterly-irregular	300	Editor, Wildlife Review, Patuxent Wildlife Research Center, Laurel, Md. 20810	Free on Request

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Table II. Outline of Wildlife Review Contents

Divisions	Sections
General conservation	Bibliography, biography, climate, directories, education, history, soils, maps.
Plants	General, ecology, forests, taxonomy, techniques, wetlands.
Wildlife	Biometrics, biotas, control of animals and vegetation, ecology, effects of chemicals and weather and vehicles, environments, wetlands, forestlands, farmlands, rangelands and stripped lands, introductions, foreign and domestic, management and research, natural history, nature protection and rare-endangered species, parasites and diseases, predation and crop damage, populations and fluctuations, refuges, techniques.
Mammals	General, techniques and mammals, shrews, moles and bats, rabbits and pikas, rodents, rattus and mus, scurids, beaver, muskrat and nutria, carnivores, bears, raccoon and ringtail and coati, dogs, wolves and foxes, cats, big game, general and deer, marine animals and plants.
Birds	General, techniques and mammals, behavior and migration, communities, populations and fluctuations, control and mortality, parasites and diseases, economics, game birds, general, quail, pheasants, grouse, partridge, turkey, doves and pigeons, waterfowl, cranes, rails and shorebirds, hawks and owls, blackbirds, starlings and crows.
Reptiles and Amphibians	Similar manner of classification as above.

While most of the above mentioned periodicals are primarily biological in content, the trend to publish more and more chemical data and procedures in them is evident. A list of titles has been presented as well as a brief discussion of the type of chemical knowledge to be found in order to assist potential literature searchers in their selection of specific chemical information on wildlife and other natural resources conservation.

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- (31) *Ibid.*, **30**, 207 (1955).
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Documentation of the Chemical Patent Literature*

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Received July 24, 1967

Chemical Abstracts Service must select, abstract, index, and distribute information on the world's chemical and chemical engineering patent literature. The accumulation and subsequent dissemination of patent information differ from the handling of journal literature in two ways. Firstly, equivalent patents are usually granted in several countries at different times, which poses the problem of determining corresponding patents. CAS handles this problem through its priority date control system and the Patent Concordance. Secondly, patent data must be sifted to obtain the scientific and technological significance CAS users normally desire, rather than the legal benefits for which the patent was written. The solution has been the use of highly skilled abstractors and indexers capable of making these distinctions.

It is the purpose of the American Chemical Society's Chemical Abstracts Service (CAS), to disseminate usable chemical and chemical engineering information to the technical public. An important part of that information appears in the patents issued to inventors by various countries. Recognizing the vital role the patent literature plays in research and development, *Chemical Abstracts (CA)* has published abstracts of patents almost since its beginning in 1907. This patent coverage has been expanded steadily and has been made more usable. Today, patents are covered not only in *CA*, but also in *POST-P (Polymer Science & Technology-Patents)*, a new computer-based information service.

The processing of the patent literature by CAS involves five operations: acquisition, selection, organization and determination of duplicates, abstracting and indexing, and distribution.

ACQUISITION

CAS monitors, in whole or in part, the patent literature of 25 countries (Table I). All Belgian, British, French, German, and United States patents of chemical and chemical engineering interest are covered. It is especially

important that CAS cover the patents of Belgium and France completely and promptly. In these two countries, patent information is disclosed within 3 to 9 months after filing with little or no examination for novelty. Thus these are very popular countries in which to file. Patents from the other 20 countries are abstracted and published only if they have been issued to individuals or companies that reside in the country where the patent was issued, or they originated in a country not otherwise covered. Although other countries issue patents, CAS does not cover these because inventions from a country not covered are almost certainly patented in one of the major countries whose patents are monitored.

Table I. Countries Whose Chemical and Chemical Engineering Patents are Covered in Whole or in Part

Australia	India
Austria	Israel
Belgium	Italy
Canada	Japan
Czechoslovakia	Netherlands
Denmark	Norway
France	Poland
Finland	Romania
Germany	Spain
Germany (East)	Sweden
Great Britain	Switzerland
Hungary	United States
	U.S.S.R.

*Presented in part at the Patent Symposium, 58th Convention of the Special Libraries Association, May 30, 1967, New York, N. Y.