

**Michigan's
Endangered
and
Threatened
Species
Program**

DEPARTMENT OF
NATURAL RESOURCES

-INTRODUCTION-

When this nation was born a scant 200 years ago, the land literally teemed with wildlife, plant and animal, and for four score years thereafter there continued to be abundant stocks of native flora and fauna. This abundance was one of the strengths of a young and growing country. It was inevitable, of course, that as man settled the land he would use or displace or redistribute many of the plants and animals, but the appalling decimation, total in some cases, of animal life that occurred in the latter half of the 19th century was never foreseen--nor the casual lack of self-restraint with which man perpetrated it. One can only imagine the outrage with which the founding fathers, particularly Washington and Jefferson who revered the natural resources of the United States, would have viewed this destruction. The vivid examples all of us know about provide documentation for what generally happened. The plains buffalo numbered in the millions in 1865 and only a few hundred in 1890--almost extinct. Here in Michigan the passenger pigeon flocks darkened the skies in 1870, and the last one, the very last one, died in a Cincinnati zoo in 1914, possibly the most dramatic and tragic of all species exterminations. And there are others, many others.

Since the advent of the 20th century, there has been a steadily growing concern about the welfare of the drastically reduced stocks of native animal and plant life still surviving from the excesses of the 19th century. Many organizations have been formed with objectives that, when carried out, directly or indirectly contribute to the protection and enhancement of plant and animal species. Examples are the Audubon Society, the Wildlife Federation and all its associated sportsmens clubs, Trout Unlimited, etc. The federal government and each state government have all developed substantial and far reaching programs to conserve our flora and fauna for the benefit of this and future generations. Despite these efforts, however, many species either continue to decline or do not increase from alarmingly low levels. Some are the most spectacular and beautiful of our wildlife such as the peregrine falcon, the wolf, the cheetah, the American lotus, and there are reasons why they now face particularly difficult survival problems. They may have always been scarce, or have low reproductive rates, or are highly intolerant in habitat selection, and, most importantly, all are especially sensitive to man's presence, with all its ramifications. They need help. Recognizing this, several pieces of specific legislation have been passed in the last several years by the federal government designed to assist the survival of these species, the most recent being the Endangered Species Act of 1973. Michigan among several other states has followed suit, and is developing a program which is described here.

-GENERAL DESCRIPTION OF PROGRAM-

Michigan's modern endangered and threatened species management efforts began in the 1950's with the dedication of habitat for the Kirtland's Warbler and later for the Prairie Chicken. Piecemeal legislation

offered the only protection for important non-game animals until the passage of P.A. 210. In 1970, Public Act No. 210 provided protection to species found on the U.S. endangered species list and to certain other animals such as the cougar, timber wolf, alligator, caiman and crocodile. The law did not provide for management other than mere protection. Michigan's comprehensive endangered species law, Act No. 203, Public Acts of 1974 (Appendix A) became effective September 1, 1974 superseding Act 210. It charges the Department of Natural Resources with the responsibility to carry out scientific investigations for the protection and enhancement of endangered and threatened species of both animals and plants. This broad new state authority provides protection for endangered and threatened species on both federal and state lists, and authorizes a full range of conservation management programs for these plants and animals including necessary land acquisition.

The Department appointed an endangered species coordinating committee to report directly to the Bureau Chief for Resources.

Special technical committees consisting of outside scientific experts were appointed to advise the Department in six major areas, i.e., fishes, amphibians and reptiles, invertebrates, birds, mammals and plants (Appendix B). The initial task of the scientific advisory committees was to screen nominations (see Appendix D for definitions) for possible inclusion in the state lists of endangered and threatened species. The species recommended for listing will have a status report and management recommendations prepared by the advisory committees for review and possible implementation by the Department.

A citizens advisory committee was also appointed, including representatives with a broad range of interests in endangered species ranging from the Michigan Pet Store Owners Association to the Michigan Audubon Society (Appendix C). This committee will provide outside review of Department policies relating to management and protection of endangered plants and animals and has critiqued the work of the scientific advisory committees.

-PROGRAM OBJECTIVES-

The following objectives are listed in order of expected implementation:

1. Provide added protection under state law for species listed as endangered or threatened by Secretary of the Interior.
2. Develop conservation management programs for species listed as endangered by the Secretary that are resident to Michigan.
3. Establish state lists of endangered and threatened species through an evaluation of best current information.
4. Implement research and survey programs on certain species to establish the current status of Michigan populations and/or limiting factors in their range and abundance.

5. Implement management programs, including land acquisition, that will make the best use of available funds in ensuring the survival and enhancement of all endangered and threatened species.

Initially Michigan's Endangered Species Program will provide added legal protection to those species listed by the Secretary of the Interior as endangered under authority of the Endangered Species Act of 1973 (P.L. 93-205). Michigan officials can now use state law to assist federal authorities in regulating the possession, trade, transportation and taking of either domestic or foreign species listed as endangered.

At the state level, the first efforts have concentrated on developing conservation management programs for resident species like the Kirtland's Warbler which have been declared federally to be endangered. Simultaneously, comprehensive studies have been initiated on resident species of plants and animals to determine which ones should be nominated for national status as endangered or threatened, and/or which should be placed on similar state lists. Listing at either the state or federal level will provide added protection for a species, and perhaps more importantly, prompt development of management plans to insure its survival.

John Byelich of the Wildlife Division has been named leader of the national recovery team for the Kirtland's Warbler by the Director of the U.S. Fish and Wildlife Service. Nels Johnson, Jr., Region II Wildlife Supervisor, also serves on this select recovery team charged with developing plans to preserve the Kirtland's Warbler.

Ralph Bailey, Region I Wildlife Supervisor, was named leader of the national recovery team for the Eastern Timber Wolf.

The first state lists on endangered species were presented to the Natural Resources Commission in February, 1976 and gained tentative approval for the holding of public hearings (see Appendix E). Once the lists of species is fully approved through the administrative process, the job of identifying the critical habitat for these species will begin, first on state-owned lands and other areas under public ownership, and then on private lands.

Ultimately management and land acquisition plans and special regulations will be developed for each endangered and threatened species, for implementation as funds become available from private, state and federal sources.

-LIMITATIONS ON SCOPE OF PROGRAM-

The entire State of Michigan, including its 24 million acres of Great Lakes waters, is included within the scope of Michigan's endangered species program. Initial management efforts for individual species will concentrate on public lands. Once lands critical to the survival of

endangered and threatened species are precisely identified, all state laws and regulations controlling water pollution, fill and dredge, coastal zone management, natural rivers, highway construction and land use planning can be used to a varying degree on both public and private lands to protect the habitats of these species.

The only statutory limitation on the scope of the endangered species program is that it does not include species of the order insecta determined to constitute a pest by either the Michigan Natural Resources Commission or the Secretary of the Interior. As a practical matter, both lower forms of plants (i.e., algae, fungi, mosses and liverworts) and very simple microscopic forms of animals will not be considered in the initial program.

The success of Michigan's endangered and threatened species program will largely depend on how effective the Department is in the identification and protection of habitat required for the survival of these species. Existing Department activities, including natural rivers and Great Lakes shoreline programs, can be utilized to preserve these important areas. Many opportunities and options for preserving these areas are available under existing state law. The challenge will be to locate and inventory the critical land and water areas.

APPENDIX A

Act 203

7/11/74

STATE OF MICHIGAN
77TH LEGISLATURE
REGULAR SESSION OF 1974

Introduced by Reps. Goemaere and Thomas J. Anderson
Rep. Mahalak named as co-sponsor

ENROLLED HOUSE BILL No. 5854

AN ACT to provide for the conservation, management, enhancement and protection of fish, plant life, and wildlife species endangered or threatened with extinction; to provide for enforcement authority; and to prescribe penalties.

The People of the State of Michigan enact:

Sec. 1. This act shall be known and may be cited as the "endangered species act of 1974".

Sec. 2. As used in this act:

- (a) "Commission" means the commission of natural resources.
- (b) "Department" means the department of natural resources.
- (c) "Director" means the director of the department of natural resources.
- (d) "Endangered species" means any species of fish, plant life, or wildlife which is in danger of extinction throughout all or a significant part of its range other than a species of insecta determined by the commission or the secretary of the United States department of the interior to constitute a pest whose protection under this act would present an overwhelming and overriding risk to man.
- (e) "Fish or wildlife" means any member of the animal kingdom, including any mammal, fish, amphibian, mollusk, crustacean, arthropod, or other invertebrate, and includes any part, product, egg, or offspring, or the dead body or parts thereof. Fish or wildlife includes migratory birds, nonmigratory birds, or endangered birds for which protection is afforded by treaty or other international agreement.
- (f) "Import" means to bring into, or introduce into, or attempt to bring into, or introduce into, any place subject to the jurisdiction of this state.
- (g) "Person" means an individual, corporation, partnership, trust, association, or any other private entity, or any officer, agent, department, or instrumentality of the federal government, of any state or political subdivision thereof, or of any foreign government.
- (h) "Plant or plant life" means any member of the plant kingdom, including seeds, roots, and other parts thereof.
- (i) "Species" includes any subspecies of fish, plant life, or wildlife and any other group of fish, plants, or wildlife of the same species or smaller taxa in common spatial arrangement that interbreed or cross-pollinate when mature.
- (j) "Take" means, in reference to fish and wildlife, to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct.
- (k) "Take" means, in reference to plants, to collect, pick, cut, dig up, or destroy in any manner.
- (l) "Threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Sec. 3. The commission shall perform those acts necessary for the conservation, protection, restoration, and propagation of endangered and threatened species of fish, wildlife, and plants in cooperation with the federal government, pursuant to Public Law 93-205, 87 Stat. 884, and with rules promulgated by the secretary of the interior thereunder.

Sec. 4. (1) The director shall conduct investigations on fish, plants, and wildlife in order to develop information relating to population, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures necessary for their continued ability to sustain themselves successfully. On the basis of these determinations and other available scientific and commercial data, which may include consultation with scientists and others who may have specialized knowledge, learning, or experience, the commission shall promulgate a rule listing those species of fish, plants, and wildlife which are determined to be endangered or threatened within the state, pursuant to Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.315 of the Michigan Compiled Laws.

(2) The commission shall conduct a review of the state list of endangered and threatened species within not more than 2 years after its effective date and every 2 years thereafter, and may amend the list by appropriate additions or deletions pursuant to Act No. 306 of the Public Acts of 1969, as amended.

Sec. 5. (1) The director may establish programs, including acquisition of land or aquatic habitat, as are deemed necessary for the management of endangered or threatened species.

(2) In carrying out the programs authorized by this section, the commission may enter into cooperative agreements with federal and state agencies, political subdivisions of the state, or with private persons for the administration and management of any area or program established under this section or for investigation as outlined in section 4.

Sec. 6. (1) Except as otherwise provided in this act, a person shall not take, possess, transport, import, export, process, sell or offer for sale, buy or offer to buy, nor shall a common or contract carrier transport or receive for shipment, any species of fish, plants, or wildlife appearing on the following lists:

(a) The list of fish, plants, and wildlife indigenous to the state determined to be endangered or threatened within the state pursuant to section 4.

(b) The United States list of endangered or threatened native fish and wildlife.

(c) The United States list of endangered or threatened plants.

(d) The United States list of endangered or threatened foreign fish and wildlife.

(2) A species of fish, plant, or wildlife appearing on any of the lists delineated in subsection (1), excepting those also named in subsection (3), which enters the state from another state or from a point outside the territorial limits of the United States may enter, be transported, possessed and sold in accordance with the terms of a federal permit issued pursuant to Public Law 93-205 or an applicable permit issued under the laws of another state.

(3) A person shall not take, possess, transport, export, import, process, sell or offer for sale, or buy or offer to buy, any of the following species, or any part or product thereof: mountain lion, puma, or cougar (*Felis concolor*); jaguar (*Panthera onca*); gray or timber wolf (*Canis lupus*); free roaming feral horse; alligator, caiman and crocodile of the order Crocodylia.

(4) The commission may, by rule, treat any species as an endangered species or threatened species even though it is not listed pursuant to section 4, if it finds that (a) the species so closely resembles in appearance, at the point in question, a species which is listed pursuant to section 4 that enforcement personnel would have substantial difficulty in attempting to differentiate between the listed and unlisted species; (b) the effect of this substantial difficulty is an additional threat to an endangered or threatened species; or (c) the treatment of an unlisted species will substantially facilitate the enforcement and further the intent of this act.

(5) The director may permit the taking, possession, purchase, sale, transportation, exportation, or shipment of species of fish, plants, or wildlife which appear on the state list of endangered or threatened species for scientific, zoological, or educational purposes, for propagation in captivity of such fish, plants, or wildlife to insure their survival.

(6) Upon good cause shown and where necessary to alleviate damage to property or to protect human health, endangered or threatened species found on the state list may be removed, captured, or destroyed, but only pursuant to a permit issued by the director. Carnivorous animals found on the state list may be removed, captured, or destroyed by any person in emergency situations involving an immediate threat to human life, but the removal, capture, or destruction shall be reported to the director or his representative within 24 hours of the act.

(7) This section does not prohibit:

- (a) The importation of a trophy under a permit issued pursuant to Public Law 93-205 which is not for resale and which was lawfully taken in a manner permitted by the laws of the state, territory, or country in which the trophy was caught, taken, or killed.
- (b) The taking of a threatened species when the commission has determined that its abundance in the state justifies a controlled harvest not in violation of federal laws or regulations.

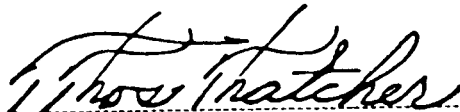
Sec. 7. A law enforcement officer, police officer, sheriff's deputy, or conservation officer shall enforce this act and the rules promulgated under this act.

Sec. 8. A person who violates any provision of this act and a person who fails to procure any permit issued under this act is guilty of a misdemeanor and shall be fined not more than \$1,000.00 nor less than \$100.00, or imprisoned for more than 90 days, or both.

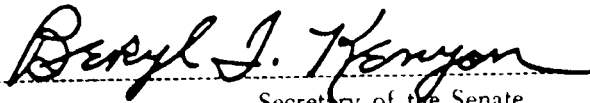
Sec. 9. This act shall not take effect unless House Bill No. 5855 of the 1974 session of the legislature is enacted into law.

Sec. 10. This act shall take effect September 1, 1974.

This act is ordered to take immediate effect.



.....
Clerk of the House of Representatives.



.....
Secretary of the Senate.

Approved

.....
Governor.

APPENDIX B

Technical Advisory Committees

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
ENDANGERED SPECIES TECHNICAL ADVISORY COMMITTEES

Fish

Dr. Robert Rush Miller (Chairman)
Professor of Zoology, Curator of Fishes
Museum of Zoology
University of Michigan
Ann Arbor, MI 48104

Dr. Peter I. Tack, Professor
Department of Fisheries & Wildlife
Natural Resources Building
Michigan State University
East Lansing, MI 48824

Dr. Stanford H. Smith
Fishery Research Biologist
National Marine Fisheries Service
P.O. Box 648
Ann Arbor, MI 48107

Dr. Edward P. Speare, Head
Department of Biology
Olivet College
Olivet, MI 49076

Amphibians and Reptiles

Dr. Donald W. Tinkle (Chairman)
Professor of Zoology and
Curator of Reptiles & Amphibians
Museum of Zoology
University of Michigan
Ann Arbor, MI 48104

Dr. Marvin M. Hensley
Professor of Zoology
Department of Zoology
220 Natural Science Building
Michigan State University
East Lansing, MI 48823

Invertebrates

Dr. Henry van der Schalie (Chairman)
Professor of Zoology and
Curator of Mollusks
Museum of Zoology
University of Michigan
Ann Arbor, MI 48104

Mr. John H. Newman
Research Technician, Entomologist
Department of Entomology
Michigan State University
East Lansing, MI 48824

Dr. Irving J. Cantrall
University of Michigan

Birds

Dr. Lewis Batts, Head (Chairman)
Kalamazoo Nature Center
2315 Angling Street
Kalamazoo, MI 49001

Dr. Nicholas Cuthbert
Biology Department
Central Michigan University
Mt. Pleasant, MI 48858

Dr. Robert W. Storer
Curator of Birds
Museum of Zoology
University of Michigan
Ann Arbor, MI 48103

Dr. George Wallace
R#1, Box 1638
Grayling, MI 49738

Dr. Norman Sloane
Michigan Technological University
Houghton, MI 49931

Mammals

Dr. Rollin Baker, Director (Chairman)
University Museum
Michigan State University
East Lansing, MI 48823

Dr. Kenneth Kramm
Department of Biological Science
Michigan Technological University
Houghton, MI 49931

Dr. Emmett T. Hooper
Curator of Mammals
Museum of Zoology
University of Michigan
Ann Arbor, MI 48103

Dr. William Robinson
Biology Department
Northern Michigan University
Marquette, MI 49855

Plants

Dr. Warren H. Wagner, Jr. (Chairman)
Botany Department
Natural Science Building
University of Michigan
Ann Arbor, MI 48104

Dr. Edward G. Voss
Curator and Professor
University of Michigan Herbarium
North University Building
Ann Arbor, MI 48104

De. Eric A. Bourdo, Dean
Forestry Department
Michigan Technological University
Houghton, MI 49931

Mr. Frederick W. Case, II
7275 Thornapple Lane
Route 180
Saginaw, MI 48603

Dr. John H. Beaman
Professor and Curator of the
Beal-Darlington Herbarium
Department of Botany and
Plant Pathology
Michigan State University
East Lansing, MI 48824

Mr. Paul W. Thompson
Research Associate in Ecology
Cranbrook Institute of Science
500 Lone Pine Road
P.O. Box 807
Bloomfield Hills, MI 48013

Dr. John A. Churchill
6857 Castle Drive
Birmingham, MI 48010

APPENDIX C

Citizens Advisory Committee

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
ENDANGERED SPECIES CITIZENS' ADVISORY COMMITTEE

Mr. Tom Herter
277 C. Deerfield Village, Apt. C
Mt. Pleasant, MI 48858

Mr. William Grigg
Michigan Audubon Society
745 Pinewood
Rogers City, MI 49779
160-1-734-4108

Mr. Thomas L. Washington
Executive Director
Mich. United Conservation Clubs
P.O. Box 2235
Lansing, MI 48911
371-1041

Mr. Max McPeck
Senator DeGrow's Office
Capitol Building
Lansing, MI 48901
373-7708

Mr. Douglas Reece, Staff Assistant
House of Representatives
Room 320, Capitol Building
Lansing, MI 48901
373-7314

Mr. William L. Harris, President
Michigan Pet Retailers Association, Inc.
P.O. Box 1144
Southgate, MI 48195
171-284-0971

Dr. Robert Wilson
27842 West Chicago
Livonia, MI 48150

Mr. Glenn R. Dudderar
Extension Specialist, Wildlife
Fisheries & Wildlife Department
Natural Resources Building
East Lansing, MI 48824
355-4477

Mr. James Johnston
Northern Michigan Sportsmen's Assoc.
P.O. Box 161
Baraga, MI 49909
161-1-906-353-6858

Ms. Mary Roth
West Michigan Environmental
Action Council
John Ball Park Zoo
John Ball Park
Grand Rapids, MI 49504
176-451-0791

Mr. Stanley A. Schultz
Noah's Ark Pet Shop
223 Ann Street
East Lansing, MI 48823
351-0437

Mr. Floyd Lodge, Superintendent
Detroit Zoological Park
8450 W. Ten Mile Road
P.O. Box 37
Royal Oak, MI 48068
171-398-0900

APPENDIX D

Definitions

DEFINITIONS

Endangered - "A species of fish or wildlife, or plant life which is in danger of extinction throughout all or a significant part of its range. . ."

The state list of "endangered" species will be those species listed by the Secretary of Interior as endangered and resident in any part of their life cycle in Michigan. It will also include those indigenous species which the State of Michigan feels should be included on the national list of endangered species because they are on the verge of extinction. The definition refers to worldwide status of a species. Also, it recognizes subspecies of fish or wildlife, or plant life, or lower taxa in a common spatial arrangement, that reproduce and represent a truly unique, identifiable form.

Threatened - "A species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. . ."

The state list of "threatened" species includes those species, and lower taxa as defined under endangered, that are threatened with extirpation in Michigan. For the purposes of state law, the Michigan range is considered significant except when the state portion of the range is considered to be peripheral. Peripheral species will not be listed as "threatened" unless their populations are also threatened in their primary range outside of Michigan. Species whose range is now reduced to a relatively few isolated populations that do not interbreed are included within this definition, as are species which were once extirpated, but are now in the process of becoming re-established through introductions.

Rare or Scarce

A species or lower taxa that while not "endangered" or "threatened", is extremely uncommon in Michigan and deserves further study and monitoring. Peripheral species, not listed as "threatened" may be included in this category along with those species which were once "threatened" or "endangered" but now have increasing or protected, stable populations.

APPENDIX E

Annotated Lists

This is a proposed annotated list of endangered and threatened species resident in Michigan that is proceeding toward final approval in accordance with the Administrative Procedures Act. The annotations briefly set forth pertinent facts about each species and why it is endangered or threatened, as far as is known.

This list also includes, in most cases, rare or scarce species, and in some instances, peripheral species. These have no standing under the Endangered Species Act of 1974, Public Act No. 203, and do not appear on the Administrative Rules list, but rare or scarce and peripheral provide categories in which to place controversial or borderline cases so that they will not be lost sight of and will be studied and monitored in order that significant population trends are promptly noted and appropriate action taken.

The members of the technical advisory committees and the citizens advisory committee have devoted many hours over the past year to the development of the proposed lists, without remuneration of any kind. Their expert assistance, of the very highest caliber, has made it possible to accomplish the task.

RECOMMENDED LIST OF ENDANGERED, THREATENED,
AND RARE MOLLUSKS IN MICHIGAN

Mussels

ENDANGERED

1. Simpsoniconcha ambigua (Say).

The shells of this species used to be found in large windrows around the western end of Lake Erie. The living animals are presumed to live under flat stones and in places where mud puppies occur. This is the only mussel known to use mud puppies as hosts for its' glochidia.

2. Obovaria leibii (Lea) = O. subrotunda (Rafinesque).

Restricted to Lake Erie and mouths of rivers flowing into it.

THREATENED

1. Pleurobema clava (Lamarck).

Not uncommon formerly in the St. Joseph of the Maumee. Intensive farming with modern development may well eliminate it in the Michigan portion of its range.

2. Elliptio complanatus (Dillwyn).

Widely distributed in the Upper Peninsula but only found in the Ocqueoc drainage of the Lower Peninsula. Extensive damage to the Ocqueoc would eliminate this important zoogeographic species.

3. Cyclonaias tuberculata (Rafinesque).

A large river species; hence, it will take the punishment the fauna in lower portions of rivers in the southern part of Michigan suffer from pollution, dredging, etc.

4. Anodonta subgibbosa (Anthony).

Confined to muddy sloughs in the western part of the state. The sites are so few that a typical habitat would be worth salvaging.

5. Actinonaias ellipsiformis (Lea).

Limited in distribution to streams flowing west into Lake Michigan; it invaded the Saginaw drainage in the post-glacial connection between the Saginaw and Grand rivers. It has a creek ecology and needs pristine conditions.

6. Lampsilis fasciola (Rafinesque).

A small river species, found only in drainages of southeastern Michigan flowing to Lake Erie. The development of the Detroit-Toledo megalopolis may well spell its doom.

7. Dysnomia triquetra (Rafinesque).

A highly sexually dimorphic species found in small river conditions in streams flowing to Lake Erie. Its future will be similar to that of Lampsilis fasciola.

RARE1. Carunculina glans (Barnes).

Mainly in Lake Erie or the mouths of rivers entering that lake. A small mussel, often with pink nacre.

2. Villosa (Micromya) fabilis (Lea).

A small and very thick-shelled species living in creeks of drainages to Lake Erie.

3. Dysnomia sulcata (Lea) = Dysnomia perplexa rangiana (Lea).

A highly sexually dimorphic species recorded mostly in the Detroit River drainage and drainages into Lake Erie, as well as Lake Erie itself.

SnailsENDANGERED

None

THREATENED1. Lymnaea megasoma (Say)

The only endemic North American lymnaeid which is found in sloughs of streams from Houghton Lake north. The ecology is sufficiently characteristic to warrant finding a site to be preserved.

2. Pomatiopsis cincinnatiensis (Lea).

Found today largely on the banks of the Raisin River where it has a unique ecology living on the mud between the waterline and the bank top. Its importance in relation to human schistosomiasis warrants trying to establish a preserve for its preservation in its natural setting.

3. Paludestrina (Fontigens) nicklineana (Lea).

A snail common in western Michigan living on watercress in cold water. Persons culturing watercress are apt to get rid of these snails. A molluscicide would spell its doom, should the few outlets of lakes that harbor it be threatened.

4. Amnicola binneyana (Hannibal) = Cincinnatia emarginata (Say).

Inhabits mud bottom at a 15-foot depth or greater in the margins of the Great Lakes. Serves as food for some lake fish. It may be threatened with pollution now entering the lakes.

5. Zoogenetes harpa (Say).

Found on litter on limestone outcrops around shoreline from Alpena to Traverse City.

6. Mesodon (Polygyra) sayana (Pilsbry).

Known only from a few counties in the central part of the southern peninsula.

7. Mesodon (Polygyra) elevata (Say).

In deep woods, in the lower corners of the state, evidently entering from the states to the south of Michigan. A rich deep woods harboring it should be set aside to preserve it (along with other species of this kind).

8. Triodopsis notata (Deshayes) = Polygyra palliata (Say).

Lives in rich hardwoods in the Saginaw-Grand Valley region.

9. Anguispira kochi (Pfeiffer) = A. solitaria (Say).

Known from southeastern Michigan where it lives in forest litter.

10. Mesomphix cupreus (Rafinesque) = Omphalina.

In woods below the Saginaw-Grand Valley region where it inhabits old and undisturbed forests. Forest removal will spell its doom.

11. Haplotrema concavum (Say) = Circinnaria.

A carnivore that feeds on other snails. It occupies the southern portion of the Lower Peninsula. Seems to have become quite rare in southeastern Michigan.

12. Discus patulus (Deshayes) = Gonyodiscus perspectivus (Say).

Confined to rich, deep forests; often found along edge of decaying logs. Extensive lumbering and farming have greatly reduced it in its range in southern Michigan.

RARE1. Lymnaea haldemani (Deshayes).

Found often on reeds in lakes. Its distribution is spotty and known in Michigan from only a few lakes, like Reeds Lake near Grand Rapids from which it vanished years ago.

2. Lymnaea contracta (Currier).

Known only from a couple of lakes in Michigan, at depths far beyond the ordinary where the clarity of the water permits vegetation to grow to unusual depths; Higgins Lake is one of the few sites known to support this species.

3. Helisoma multivolvis (Case).

Known only from Howe Lake in northern Michigan. Several attempts have been made to find it in recent years, but it has not been found since the original discovery in 1906.

4. Pyrgulopsis letsoni (Walker).

Seldom, if ever, found alive but often found in pleistocene deposits. E. G. Berry found live material in the Huron River above Ann Arbor. The changes in the river in recent years probably preclude ever finding it there again.

5. Planogyra astericus (Morse).

Lives in litter at edge of cedar swamps. Recorded from Isle Royale and the Porcupine Mountains, Ontonagon County.

6. Philomycus carolinianus (Bosc).

A large slug with a mottled mantle, living often under loose bark of decaying hardwood trees.

RECOMMENDED LIST OF ENDANGERED, THREATENED
AND RARE INSECTS IN MICHIGAN

ENDANGERED

1. Columbia Silkmoth columbia (Smith).
Habitat is
2. Mitchell mitchellii (French).
3. eris protodice (Boisduval and LeConte).
of the cabbage butterfly.

INSECTS HAVE BEEN
REMOVED FROM THE LIST

THREATENED

None

RARE

1. Appalachia arcana (Hubbell and Cantrall).
Known only from bogs in eight counties in northern part of the southern peninsula. Filling bogs and lowland, as at Wurtsmith Air Force Base (the type locality of arcana now under ten inches of concrete), can result in extirpation of the species.
2. Atlantiscus davisii (Rehn and Hebard).
An Appalachian form with disjunct, relict populations in seven counties in the northern part of the southern peninsula of Michigan.
3. Oecanthus pini (Beutenmuller).
An Appalachian form relict and disjunct in Berrien County.
4. Oecanthus laricis (T. J. Walker).
Known only from two counties in southern Michigan and one in northern Ohio. A bog form living on Tamarack.
5. Liodessus cantralli (Young).
This water beetle is known only from a small bog lake in Livingston County, Michigan.

RECOMMENDED LIST OF ENDANGERED, THREATENED
AND RARE FISHES IN MICHIGAN

ENDANGERED

1. Longjaw cisco, Coregonus alpenae (Koelz).

This species is officially listed as endangered by the Secretary of the Interior. It was last reported in Lake Erie in 1961, and is believed to be extinct in Lakes Huron and Michigan.

2. Deepwater cisco, Coregonus johannae (Wagner).

This species is regarded (by the Great Lakes Fishery Laboratory, U.S. Department of Interior) as extinct in both Lake Huron and Lake Michigan, the only known places where it occurred. Nevertheless, we recommend this listing to get the species on record for a year or so. It is very difficult to be certain of extinction of species unless the distribution is so localized that there can be no question of survival.

3. Blackfin cisco, Coregonus nigripinnis (Gill).

Regarded to be extinct in Lakes Ontario, Huron, Michigan and Superior. Recent studies on Lake Superior fish indicate that, although the species was recorded from this lake by Koelz, in actuality the species he had from Lake Superior was C. zenithicus (Parsons et al., 1975, mimeo account of status of some endemic Great Lakes fishes). The reason for listing this species is the same as given under the account of C. johannae.

4. Shortnose cisco, Coregonus reighardi (Koelz).

Regarded as extinct in Lake Ontario, endangered in Lakes Huron and Michigan, and greatly reduced in Lake Superior (according to the Great Lakes Fisheries Laboratory).

5. Shortjaw cisco, Coregonus zenithicus (Jordan and Evermann).

Regarded as greatly reduced in Lake Superior, and as erroneously recorded by Koelz from Lakes Huron and Michigan (his specimens are properly identified as C. reighardi--Parsons et al., 1975--see above).

6. Blue pike, Stizostedion vitreum glaucum (Hubbs).

Although we have no valid basis for regarding this fish as surviving at the present time in Lake Erie, the only known locality of occurrence, we recommend "endangered" status for a year or so, just to keep the species "on record" until its status is finalized. The fish is officially recognized as endangered by the Secretary of the Interior.

THREATENED1. Lake sturgeon, Acipenser fulvescens (Rafinesque).

Sturgeons as a group are late-maturing, and very long-lived fishes that do not tolerate a high level of exploitation. They are diminishing notably in numbers in many parts of the world. In Michigan, because of purposeful over-exploitation during the late 1800's, this species was greatly reduced in all lakes by the early 1900's. In fact, this fish became so scarce by the 1920's that sturgeon fishing was prohibited throughout most U.S. waters of Lakes Superior, Michigan and Huron. The species now occurs in Michigan in less than five percent of its former abundance. We recommend "threatened" status because there are places where a regulated sport fishery is compatible with maintenance of the species. The fishery should be carefully monitored to make sure that sufficient breeding stock persists each year. Maturity is not attained by most females of this species until an age approaching 25 years is reached; males mature between 14 and 20 years.

2. Cisco or lake herring, Coregonus artedii (Lesueur).

It is regarded by the Great Lakes Fishery Laboratory as rare or threatened in Lake Erie, threatened in Lakes Huron and Michigan, and declining (i.e., showing a recent general decline in abundance that obviously is not part of natural fluctuations) in Lake Superior. Placing it in the "threatened" category means that it becomes a legal candidate for financial aid in trying to halt its decline.

3. Bloater, Coregonus hoyi (Gill).

This species is declining in Lake Huron, threatened in Lake Michigan, and declining in Lake Superior. It is assigned to "threatened" status for the reason given above, for C. artedii.

4. Kiyi, Coregonus kiyi (Koelz).

Regarded as extinct in Lakes Ontario and Huron, endangered in Lake Michigan, and declining in Lake Superior (Great Lakes Fishery Laboratory). These are the only lakes from which the species is known.

5. Silver shiner, Notropis photogenis (Cope).

This species, peripheral in Michigan, is now very rare here, occurring naturally only in the southeastern part of the state. In recent years, it has been taken only in the Huron River (1940, 1954) and Raisin River (1973). This species, and several to follow, are part of the natural wildlife heritage of Michigan. The Committee feels that, irrespective of the status of peripheral Michigan species outside of the state, it is important that we retain as much of our native biota as possible. Placing this species in the threatened category calls attention to its rarity in Michigan, and to its need for help if it is to remain a part of our biota.

6. Redside dace, Clinostomus elongatus (Kirtland).

This species has a very discontinuous range in the U.S. and occurs in Michigan only in a few tributaries of Lake Erie. Our only recent record (1970) is from near Farmington, in the outlet to Devil's Lake. Reasons for listing this peripheral species are the same as given above for the silver shiner.

7. River redhorse, Moxostoma carinatum (Cope).

The first (and last) valid known record of this mollusk-eating fish for Michigan is of a single adult taken on 25 July 1935 at Croton Dam, Newaygo County, in the Muskegon River drainage. An effort should be made to determine if the species still persists in that basin.

8. Northern madtom, Noturus stigmosus (Taylor).

This small catfish is known in Michigan only in the Huron River, except for one record (1938) from the junction of Lake St. Clair and the Detroit River. It has not been observed in the Huron River since 1954. Reasons for retaining it in our fauna are the same as given for the silver shiner (item 5.).

9. Eastern sand darter, Ammocrypta pellucida (Agassiz).

Species of this genus generally require clear, clean water with sand bottom; this type of habitat is under threat nearly everywhere. This fish--rare and peripheral in Michigan--is known from the St. Joseph River of the Maumee River basin (1929); Little Raisin River in Dover Township, Lenawee County (1927); Rouge River at Rouge Park, Wayne County (1936); Strawberry Lake, Livingston County (1949--and likely still present); Bouvier Bay of Lake St. Clair (1942); Big Gallagher Lake, Livingston County (1955); and Saline River near its mouth (1929). Reasons for retaining this peripheral species in Michigan's biota on our list are the same as given for the silver shiner (item 5.).

RARE

None

RECOMMENDED LIST OF ENDANGERED, THREATENED
AND RARE AMPHIBIANS IN MICHIGAN

ENDANGERED

None

THREATENED

1. Marbled Salamander, Ambystoma opacum (Gravenhorst).

This chunky and attractive salamander is very restricted in distribution. It is unusual in that it usually lays eggs during the fall in or near places likely to be flooded by winter moisture. The adults live in forested and low flood plain areas. Landfill and land clearance are the most obvious threat to their existence in the state; it is known from only one Michigan locality--in Berrien County.

2. Small-mouthed Salamander, Ambystoma texanum (Matthes).

This salamander is highly fossorial, spending much of its time in burrows and under logs. It is most abundant in somewhat open hardwood areas. It requires temporary pools for breeding in late winter and, therefore, is vulnerable to land clearing and draining practices; known only from three southeastern counties in Michigan, where it is common in a few localities.

3. Western Lesser Siren, Siren intermedia nettingi Gojn

Siren are peculiar snake-like salamanders with external gills and short front limbs; hind limbs are absent. They are entirely aquatic and extremely restricted in their distribution in Michigan. Therefore, even slight changes in habitat in the few areas in which the species occurs could result in its extirpation in Michigan. It is, however, a very common species in many places in southeastern U.S. In Michigan, it is known from one locality each in Allegan and Van Buren counties.

RARE

1. Four-toed Salamander, Hemidactylium scutatum.

This small, poorly known salamander is generally found associated with decaying logs in wet woods; it requires ponds and bogs for breeding. Clearing of forests and woodlots, and draining and filling of low areas, are threats to its existence. In Michigan, we have records from 22 counties, scattered throughout the state.

RECOMMENDED LIST OF ENDANGERED, THREATENED
AND RARE REPTILES IN MICHIGAN

ENDANGERED

None

THREATENED

1. Black Rat Snake, Elaphe obsoleta obsoleta (Say).

This is the largest species of snake native to Michigan; it may reach a length of more than seven feet. Although common farther south in adjoining states, it is relatively uncommon in Michigan. This snake inhabits forests and woodlots; therefore, deforestation is the principal threat to its existence in Michigan. It feeds on small mammals, birds and bird eggs. It has potential economic importance by feeding on small rodents that feed on grain; however, it is not sufficiently common for this economic asset to be of significance. In Michigan, it is known from about 13 localities in eleven south-central and southeastern counties.

2. Northern Copperbelly, Natrix erythrogaster neglecta Conant

One of the largest of watersnakes in the U.S., this species, seemingly does well even in areas that are opened for development. However, since large water-dwelling snakes are considered poisonous by most people, slaughter of the snakes by man probably constitutes the greatest threat to its existence. In Michigan, it is known from a single locality in each of four southwestern counties.

3. Kirtland's Water Snake, Natrix (Clonophis) kirtlandi (Kennicott).

This small, attractive watersnake is poorly known throughout its range. It lives mostly in open, grassy areas and is less aquatic than most watersnakes. The young are born alive, as in other related species. Although it may be abundant in scattered localities, it is a rare species and probably threatened throughout its range. The species may have been rare and probably threatened prior to widespread habitat destruction by man. It has been reported in greatest abundance in urban localities in adjoining states, but its future there is obviously threatened by real estate developments. In Michigan, it is known from only seven localities in three southern counties.

4. Eastern Box Turtle, Terrapene carolina carolina (Linnaeus).

This attractive land turtle is fairly widely distributed in Michigan, but is spotty in its occurrence and nowhere very abundant. Most often found in or near open hardwood stands with sandy soil. The species is

