

**ACTION:** Final rule.

**SUMMARY:** The Service determines endangered status for the dwarf wedge mussel (*Alasmidonta heterodon*). This freshwater mussel has declined precipitously over the last one hundred years. Once found in approximately 70 locations in 15 major Atlantic slope drainages from New Brunswick to North Carolina, it is now known from only ten localities. The extant populations occur in the Ashuelot River in Cheshire County, New Hampshire; two reaches of the Connecticut River in Sullivan County, New Hampshire, and Windsor County, Vermont; McIntosh Run in St. Marys County, Maryland; two tributaries of Tuckahoe Creek in Talbot, Queen Annes and Caroline Counties, Maryland; Little River in Johnston County, North Carolina; the Tar River in Granville County, North Carolina; and two Tar River tributaries in Franklin County, North Carolina. All extant populations are small, and probably declining due to continued environmental degradation. Threats include siltation, pollution, agricultural and urban runoff, channelization, land development, road and dam construction. This rule will implement Federal protection provided by the Endangered Species Act of 1973, as amended.

**DATES:** April 13, 1990.

**ADDRESSES:** The complete file for this rule is available for inspection, by appointment, during normal business hours at the Annapolis Field Office, U.S. Fish and Wildlife Service, 1825 Virginia Street, Annapolis, Maryland 21401.

**FOR FURTHER INFORMATION CONTACT:** Mr. G. Andrew Moser at the above address (301/269-5448).

**SUPPLEMENTARY INFORMATION:****Background**

The dwarf wedge mussel was first described by Lea (1829) as *Unio heterodon*; it was subsequently placed in the genus *Alasmidonta*. The species name *heterodon* refers to the chief distinguishing characteristic of this species, which is the only North American freshwater mussel that consistently has two lateral teeth on the right valve, but only one on the left (Fuller 1977). It is a small mussel whose shell rarely exceeds 1.5 inches in length. The species exhibits strong sexual dimorphism with females showing posterior inflation of the shell to accommodate the marsupial gills.

The dwarf wedge mussel lives on muddy sand, sand, and gravel bottoms in creeks and rivers of varying sizes, in

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**DEPARTMENT OF THE INTERIOR****Fish and Wildlife Service****50 CFR Part 17****RIN 1018-AB31****Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Dwarf Wedge Mussel****AGENCY:** Fish and Wildlife Service, Interior.

areas of slow to moderate current and little silt deposition. The most commonly associated freshwater mussels are *Elliptio complanata* and *Alasmidonta undulata*. Other co-occurring mussels include *Strophitus undulatus*, *Anodonta cataracta*, *Elliptio lanceolata*, *Elliptio fisheriana*, and *Lampsilis radiata*.

In the species as a whole, the gravid (egg-laden) females are found from late August to June (Clarke 1981). The host fish, to which the larval mussels attach, has not been determined. *A. heterodon* recently disappeared from New Brunswick waters still supporting a diversity of other mussels, including sensitive species such as *Alasmidonta varicosa*, following construction of a causeway blocking the passage of anadromous fishes. This fact, coupled with the coastal distribution of *A. heterodon*, suggests that the host fish may be an anadromous or catadromous species (Master 1986).

The dwarf wedge mussel was once widely distributed in river systems of the Atlantic slope from New Brunswick, Canada, south to the Neuse River system in North Carolina. It was recorded from 70 localities in 15 drainages in 11 states and one Canadian province (Master 1986). River systems historically inhabited by this species included: the Petitcodiac River system in New Brunswick; the Taunton River, Agawam River, Merrimac River, Connecticut River and Quinnipiac River systems in New England; the Hackensack River, Delaware River, and Susquehanna River systems in the Middle Atlantic states; the Choptank River, Rappahannock River, James River, Tar River and Neuse River systems in the Southeast.

Based on The Nature Conservancy's rangewide status survey (Master 1986) and other recent survey data, *A. heterodon* is now thought to be extirpated from all but ten small sites in five drainages in four states. The extant populations occur in the Ashuelot River in Cheshire County, New Hampshire; two reaches of the Connecticut River in Sullivan County, New Hampshire, and Windsor County, Vermont; McIntosh Run in St. Mary's County, Maryland; two tributaries of Tuckahoe Creek in Talbot, Queen Annes and Caroline Counties, Maryland; Little River in Johnston County, North Carolina; the Tar River in Granville County, North Carolina; and two Tar River tributaries in Franklin County, North Carolina. One population of this mussel occurring in the Fort River in Hampshire County, Massachusetts, considered extant by Master (1986), now appears to be extirpated.

Despite a considerable amount of unionid (freshwater mussel) field work in recent years throughout the range of this species, the few new populations discovered were mostly near previously known populations, attesting both to the coverage of historical field work and to the widespread decline of this species. There may be as few as four viable populations (Ashuelot River, Connecticut River, Tar River and Tuckahoe Creek drainages), each of which occupies a very limited area where they face an uncertain future due to threats of development, pollution, dam and bridge construction, etc. (Master 1986).

In the Federal Register of May 22, 1984 (49 FR 21675), the dwarf wedge mussel was included in category 2 of the Service's Review of Invertebrate Wildlife. Category 2 comprises those taxa for which proposed listing is possibly appropriate but for which conclusive data on biological vulnerability are not available to support a proposed rule. Completion of The Nature Conservancy's status survey provided much of the data needed to support a listing proposal. On April 17, 1989, the Service published in the Federal Register (54 FR 15236) a proposed rule to list the dwarf wedge mussel as an endangered species.

#### Summary of Comments and Recommendations

In the April 17, 1989, proposed rule and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. Newspaper notices inviting general public comment were published in The Enterprise (Lexington Park, Maryland), The Times-Record (Denton, Maryland), the News and Observer (Raleigh, North Carolina), the Valley News (White River Junction, Vermont), the Eagle Times (Claremont, New Hampshire), and the Keene Sentinel (Keene, New Hampshire) between April 22 and May 3, 1989. Fifteen comments were received and are discussed below.

Thirteen letters indicating support for the proposal were received from the following sources: Vermont Department of Fish and Wildlife, Massachusetts Division of Fisheries and Wildlife, North Carolina Wildlife Resources Commission, Maryland Forest, Park and Wildlife Service, the Wilmington District of the Army Corps of Engineers, The Nature Conservancy, the Cheshire

County Conservation District, the American Fisheries Society, the Concerned Citizens for the Preservation of Little River, researchers at the University of Massachusetts and the Virginia Polytechnic Institute and State University, and one private citizen.

One commentator felt that the dwarf wedge mussel might more appropriately be classified as threatened in light of the number of known populations and the possibility that additional populations may be discovered. The Service agrees that additional small populations of this species may exist. However, the small size of the known populations together with the dramatic decline seen throughout most of this species' range, including the recent population crash in the Ashuelot River, indicate that endangered status is appropriate.

Letters indicating neither support nor opposition to the proposed listing of the dwarf wedge mussel were received from the Director of the Fisheries Research Branch of Canada's Department of Fisheries and Oceans, and the New England Division of the Army Corps of Engineers. Comments supplementing the data presented in the "Background" and "Summary of Factors Affecting the Species" are incorporated in those sections of this final rule.

#### Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the dwarf wedge mussel should be classified as an endangered species. Procedures found at section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the dwarf wedge mussel (*Alasmidonta heterodon*) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* Habitat modification has been an important factor in the dramatic reduction in the distribution of this mussel. The damming and channelization of rivers throughout the species' range has resulted in the elimination of much formerly occupied habitat. For example, dams have converted much of the Connecticut River mainstream into a series of impoundments. Immediately upstream from each dam, conditions, including heavy silt deposition and low oxygen

levels, are inimical to mussel species such as the dwarf wedge mussel. Immediately downstream from these dams, daily water level and water temperature fluctuations as a result of intermittent power generation and hypolimnetic discharges are also stressful to mussels. In some areas below dams the river banks have been stabilized and the substrate is no longer suitable for any bivalve species.

Dams may also cause a more subtle influence on this species. The Petitcodiac River in New Brunswick still provides a suitable habitat for other rate, declining, and apparently sensitive mussels such as the brook floater (*Alasmidonta varicosa*), but the dwarf wedge mussel is now absent. In the intervening years since the dwarf wedge mussel was collected in this drainage, a downstream causeway has acted as a dam, blocking access to the dwarf wedge mussel habitat by anadromous fishes. Although the fish host(s) of the dwarf wedge mussel is unknown, the mussel's absence from the Petitcodiac suggests the possible loss of an anadromous or catadromous fish host.

The disappearance of the dwarf wedge mussel from most of its historic sites can best be explained by agricultural, domestic, and industrial pollution of its aquatic habitat. Mussels are known to be sensitive to potassium (a common pollutant associated with paper mills and irrigation return water), zinc, copper, cadmium, and other elements (Havlik and Marking 1987). Pesticides, chlorine, excessive nutrients, and silt carried by agricultural runoff also present a threat to this species.

No mussels survive in several large, undammed sections of the Connecticut and Delaware River drainages where water pollution has exerted a heavy toll on the benthic fauna. Even where water quality has improved, as in the lower Connecticut River, chemicals trapped in the sediments inhabited by mussels may impede the recovery of sensitive species (Master 1986).

One of the largest known remaining populations of the dwarf wedge mussel occurs where the Ashuelot River meanders through a golf course. This population has undergone a dramatic decline over the last five years. The continuing decline of the dwarf wedge mussel at this site, particularly downstream of the golf course, may well be attributed to fungicides, herbicides, insecticides, and fertilizers applied to the golf course and to agricultural runoff from abutting corn fields and pastures (Master 1986).

Pollutants may also affect the mussels indirectly; nitrogen and phosphorus input cause organic enrichment and, if

extreme, oxygen depletion. Acid rain may mobilize toxic metals and lead to decreased alkalinity which is inimical to most mussels. Increased acidity appears to have contributed to the recent decline of the dwarf wedge mussel in the Fort River in Massachusetts (D. Smith, Univ. of Massachusetts Museum of Zoology, pers. comm.).

Erosion and siltation resulting from land clearing and grading and construction of bridges, roads, and other structures may be especially damaging to the dwarf wedge mussel's habitat. For instance, in Massachusetts, a dwarf wedge mussel population was decimated in one small stream when "the construction of a small bridge resulted in accelerated sedimentation and erosion which buried and killed many of the bivalves" (Smith 1981).

Paradoxically, some bank erosion control measures such as riprapping may also adversely affect the species. A significant portion of one of the extant Connecticut River populations was eliminated in 1987 by burial under rock riprap placed along the shore of a Vermont state park (F. Brackley, New Hampshire Natural Heritage Inventory, pers. comm.).

**B. Overutilization for commercial, recreational, scientific, or educational purposes.** Although collection was probably an insignificant factor in the species' decline, it is a serious threat to the few remaining populations. These populations are vulnerable because of their small size and because the entire population may occur in a few hundred years of stream length. Furthermore, because of its rarity and unusual shell anatomy, the species is sought by collectors.

**C. Disease or predation.** Although the dwarf wedge mussel is presumably utilized for food by mammals such as, mink, muskrat, and raccoon, predation is not thought to be a significant factor in the decline of this species.

**D. The inadequacy of existing regulatory mechanisms.** The dwarf wedge mussel is listed as a State endangered species in Maryland, Massachusetts, New Hampshire, and Vermont; North Carolina has included this mussel on their proposed list of endangered and threatened species. Although State listing provide limited protection against taking, in most of these states they provide little or no protection of habitat. They will not be adequate to prevent the species' further decline.

**E. Other natural or manmade factors affecting its continued existence.** The dwarf wedge mussel is threatened by its limited distribution and low numbers. Most of the sites where this species

occurs are isolated from each other. This creates isolated gene pools that are vulnerable to loss of genetic variability. Furthermore, because this species, like all freshwater mussels, depends on water currents to transport gametes from one individual to another, its reduced numbers and population densities decrease the likelihood of successful reproduction.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. Based on this evaluation, the preferred action is to list the dwarf wedge mussel as an endangered species. This species has been extirpated from most of the localities from which it was known historically. The small size and very limited geographic extent of each of this mussel's remaining populations makes them extremely vulnerable to extirpation. Any of these small populations could be eliminated by a single catastrophic event such as a chemical spill; several face imminent threats from dam construction, bridge construction, or channelization. Threatened status would therefore not be appropriate. Critical habitat is not designated for the reasons given in the following section.

#### Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time a species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not prudent for the dwarf wedge mussel at this time. This rare and unusual mussel is sought after by amateur and scientific collectors. Its occurrence in small, localized populations makes this species particularly vulnerable to overcollecting. Because of this, the Service believes a detailed description of the species' habitat, required as part of any critical habitat designation, could increase the species' vulnerability to illegal taking and increase law enforcement problems. Therefore, it would not be prudent to designate critical habitat for this species. Doing so would draw attention to the dwarf wedge mussel and risk depletion of its already limited populations.

#### Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for

Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and local governments and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. Such actions are initiated by the Service following listing. Some actions may be initiated prior to listing, circumstances permitting. Recovery actions that may be beneficial to the dwarf wedge mussel include:

- (1) Determination of the host fish(es);
- (2) Determination of the species' sensitivities to various pollutants and water quality factors;
- (3) Controlling pollution and runoff from adjacent and upstream areas of the watersheds inhabited by the mussel;
- (4) Monitoring of all remaining populations of the species;
- (5) Establishing conservation easements along selected river and stream corridors;
- (6) Transplants of the species to unoccupied historical sites having appropriate substrate and water quality conditions.

The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal activities that could impact the dwarf wedge mussel include, but are not limited to the following: Road, bridge and dam construction; stream channelization; permits for effluent

discharges and stream alterations; licensing of hydroelectric facilities; and registration of pesticides. One specific project having Federal involvement which could impact the species has been identified. This project involves the construction of a new bridge crossing for Maryland Route 404 over a tributary of Tuckahoe Creek in Maryland. The Service has conferred with the Maryland State Highway Administration regarding methods to minimize impacts of this proposed project on the dwarf wedge mussel.

The Act and implementing regulations found at 50 CFR 17.21 set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take, import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any endangered fish or wildlife species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions would apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving endangered wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.22 and 17.23. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities.

**National Environmental Policy Act**

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

**References Cited**

Clarke, A.H. 1981. The Tribe Alasmidontini (Unionidae: Anodontinae). Part I: *Pegias*, *Alasmidonta*, and *Arcidens*. Smithsonian Contributions to Zoology, No. 326. 101 pp.

Fuller, S.L.H. 1977. Freshwater and Terrestrial Mollusks. In J.E. Cooper et al (eds.), *Endangered and Threatened Plants and Animals of North Carolina*. N.C. State Museum of Natural History, Raleigh, NC. Pp. 143-194.

Havlik, M.E., and L.L. Marking. 1987. Effects of Contaminants on Naiad Mollusks (Unionidae): A Review. U.S.D.O.I., Fish and Wildlife Service, Resource Publication 164. Washington, DC. 20 pp.

Lea, I. 1829. Description of a New Genus of the Family of Naiades [etc.]. Transactions of the American Philosophical Society, new series. 3:403-456.

Master, L. 1986. *Alasmidonta heterodon*; Results of a Global Status Survey and Proposal to List as An Endangered Species. A report submitted to Region 5 of the U.S. Fish and Wildlife Service. 10 pp. and appendices.

Smith, D. 1981. Selected Freshwater Invertebrates Proposed for Special Concern Status in Massachusetts (Mollusca, Annelida, Arthropoda). Massachusetts Department of Environmental Quality Engineering, Division of Water Pollution Control. 26 pp.

**Author**

The primary author of this rule is G. Andrew Moser, Annapolis Field Office, U.S. Fish and Wildlife Service, 1825 Virginia Street, Annapolis, Maryland 21401 (301/269-5448).

**List of Subjects in 50 CFR Part 17**

Endangered and threatened species, Fish, Marine mammals, Plants (agriculture).

**Regulation Promulgation**

**PART 17—[AMENDED]**

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

- 1. The authority citation for part 17 continues to read as follows:

**Authority:** 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1543; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500, unless otherwise noted.

- 2. Amend § 17.11(h) by adding the following, in alphabetical order under "CLAMS," to the List of Endangered and Threatened Wildlife:

**§ 17.11 Endangered and threatened wildlife.**

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(h) \* \* \*

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
CLAMS							
Mussel, dwarf wedge.....	<i>Alasmidonta heterodon</i> .....	U.S.A. (CT, DC, DE, MA, MD, NC, NH, NJ, PA, VA, VT), Canada (NB).	NA.....	E	376	NA	NA

Dated: February 15, 1990.

**Knute Knudson, Jr.,**  
*Acting Assistant Secretary for Fish and Wildlife and Parks.*

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