Bull. New Jersey Acad. Sci.
Vol. 23, No. 1, pp. 26-33, Spring 1978

A REPORT ON THE STATUS OF THE ENDANGERED REPTILES AND AMPHIBIANS OF NEW JERSEY

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ABSTRACT. *A report on the status of the following endangered reptiles and amphibians of New Jersey is given: Blue-spotted salamander* (Ambystoma laterale), *Tiger salamander* (Ambystoma tigrinum tigrinum), *Pine Barrens treefrog* (Hyla andersoni), *Gray treefrogs* (Hyla chrysoscelis *and* H. versicolor) *and the Bog turtle* (Clemmys muhlenbergi). *The possible occurrence of Tremblay's salamander* (Ambystoma tremblayi) *is also discussed. We review the general distribution of the species studied, their current status, reasons for their decline and make recommendations for protecting and increasing populations.*

INTRODUCTION

A preliminary and unofficial list of rare and endangered species of New Jersey appeared in 1971 (Heintzelman, 1971). The Department of Environmental Protection, Division of Fish, Game and Shell Fisheries established the Nongame and Endangered Species Project in 1973. A primary goal of the project was to identify and protect the endangered and threatened species of New Jersey.

In 1974 the Nongame and Endangered Species Project supported us in an investigation into the status of the following endangered and threatened species: Blue-spotted salamander (*Ambystoma laterale*), Tiger salamander (*Ambystoma tigrinum*), Pine Barrens treefrog (*Hyla andersoni*), Gray treefrog complex (*Hyla chrysoscelis* and *H. versicolor*), and the Bog turtle (*Clemmys muhlenbergi*).

For two years an intensive field study was conducted to determine the distribution and status of these species (Table 1). This survey was augmented by museum records, literature localities and previous field data.

The final report on this project was submitted in April, 1976. In addition to detailed distributional and status information, the report includes many aspects of the species' ecology and specific recommendations for the protection and improvement of their status. Preliminary data indicated the existence of a species of salamander, *Ambystoma tremblayi,* previously unrecorded in the state.

The main purpose of the present paper is to present a condensed summary of that report to

Manuscript received 3 Aug. 1977.
Manuscript accepted 25 Aug. 1977.

TABLE 1. — Species distribution by county.

	Ambystoma tigrinum tigrinum	*Ambystoma laterale*	*Ambystoma tremblayi*	*Hyla chrysoscelis*	*Hyla versicolor*	*Hyla andersoni*	*Clemmys muhlenbergi*
Atlantic	X					X	
Bergen					X		X
Burlington	X				X	X	X
Camden	X				X	X	X
Cape May	X			X	X	X	X
Cumberland	X			X	X	X	
Essex					X		
Gloucester	X				X	X	X
Hunterdon					X		
Mercer					X		X
Middlesex						X	X
Monmouth					X	X	X
Morris		X	X		X		X
Ocean	X				X	X	X
Passaic					X		X
Salem	X				X	X	X
Somerset					X		X
Sussex					X		X
Union					X		X
Warren					X		X

the scientific community of New Jersey. A second objective is to alert that community to the need for additional information on these species and to stimulate local programs for the study and preservation of these and other endangered species. Financial constraints prevent the State from vigorously enforcing the protected status of these species and from funding the necessary research programs. It is our hope to make local naturalists aware of these problems and our recommendations. Education and research programs can then be implemented to prevent further depletion of populations and destruction of habitat. An obvious use of this paper would be in the preparation of Environmental Impact Statements and for Natural Resource Inventories. We therefore review the general distributions of the species studied, their current status, reason for their decline and make recommendations for increasing populations.

SPECIES ACCOUNTS

Ambystoma laterale — Blue-Spotted Salamander

The distribution of this species coincides with the basin formed by Lake Passaic during the late Pleistocene (Anderson and Giocosie, 1967) (Fig. 1). Since the New Jersey populations are disjunct from the main distribution of the species (New England, upper New York west to the Great Lakes), they are probably relict populations dating back to the last glacial age.

The terrestrial adults require mature woodlands slightly above swamp and marshland level, with deep humus and rotted logs. The breeding habitats (wooded swamps, marshes, and woodland ponds) must be in close proximity to the woodland habitat. Man-made barriers, such as roads, inhibiting migration between the two habitats are clearly detrimental. Alteration of the water table by ditching or any form of drainage is disastrous to the breeding site and may alter the terrestrial habitat. Thus any plans that involve clearing of woodland swamps or disruption of water level throughout the range must be avoided or minimized if this species is to survive.

Ambystoma tremblayi — Tremblay's Salamander

The Tremblay's salamander is virtually indistinguishable from the blue-spotted salamander (Conant, 1975). This gynogenetic species is dependent upon the presence of *Ambystoma laterale,* although the converse is not true (Uzzell, 1964). Preliminary erythrocyte analysis indicates the possible occurrence of *Ambystoma tremblayi* in the vicinity of the Great Piece Meadows, Morris County (Wilbur, 1976) (Fig. 1). Karyotypic and/or electrophoretic data confirming the existence of this species is not available at present. Habitat requirements are essentially the same as the Blue-spotted salamander.

Ambystoma tigrinum tigrinum — Tiger Salamander

Human activities have reduced the range of this species in New Jersey to fewer than a dozen breeding localities (Anderson, 1976) (Fig. 2). The natural breeding habitat has been completely obliterated by the drainage of hardwood swamps and ponds, and other activities which may lower the water table. However, being an adaptable pioneer species that can quickly colonize new ponds, Tiger salamanders avoided extinction by invading ponds that had formed in gravel excavation pits throughout southern New Jersey. Pressures of human disturbances, including periodic digging in gravel pits and destruction of terrestrial habitat (Oak woodlands), have eliminated the species from all but a few less disturbed regions of Cumberland and Cape May counties.

Hyla andersoni — Pine Barrens Treefrog

Endangered throughout its entire range, this species has its last stronghold in the Pine Barrens of New Jersey (Fig. 3). The major threat to *Hyla andersoni,* in New Jersey, is habitat destruction. The acidic waters and unique vegetation of this region creates a fragile natural community necessary for the survival of this species. Any alteration of the Pine Barrens' aquifer, through human alteration or chemical manipulation, would result in irreversible damage to the indigenous flora and fauna.

Hyla chrysoscelis — Gray Treefrog

This treefrog is restricted to a few localities in Cape May and Cumberland counties (Fig. 4).

The breeding habitat of *Hyla chrysoscelis* is now mostly gravel pit ponds but several natural

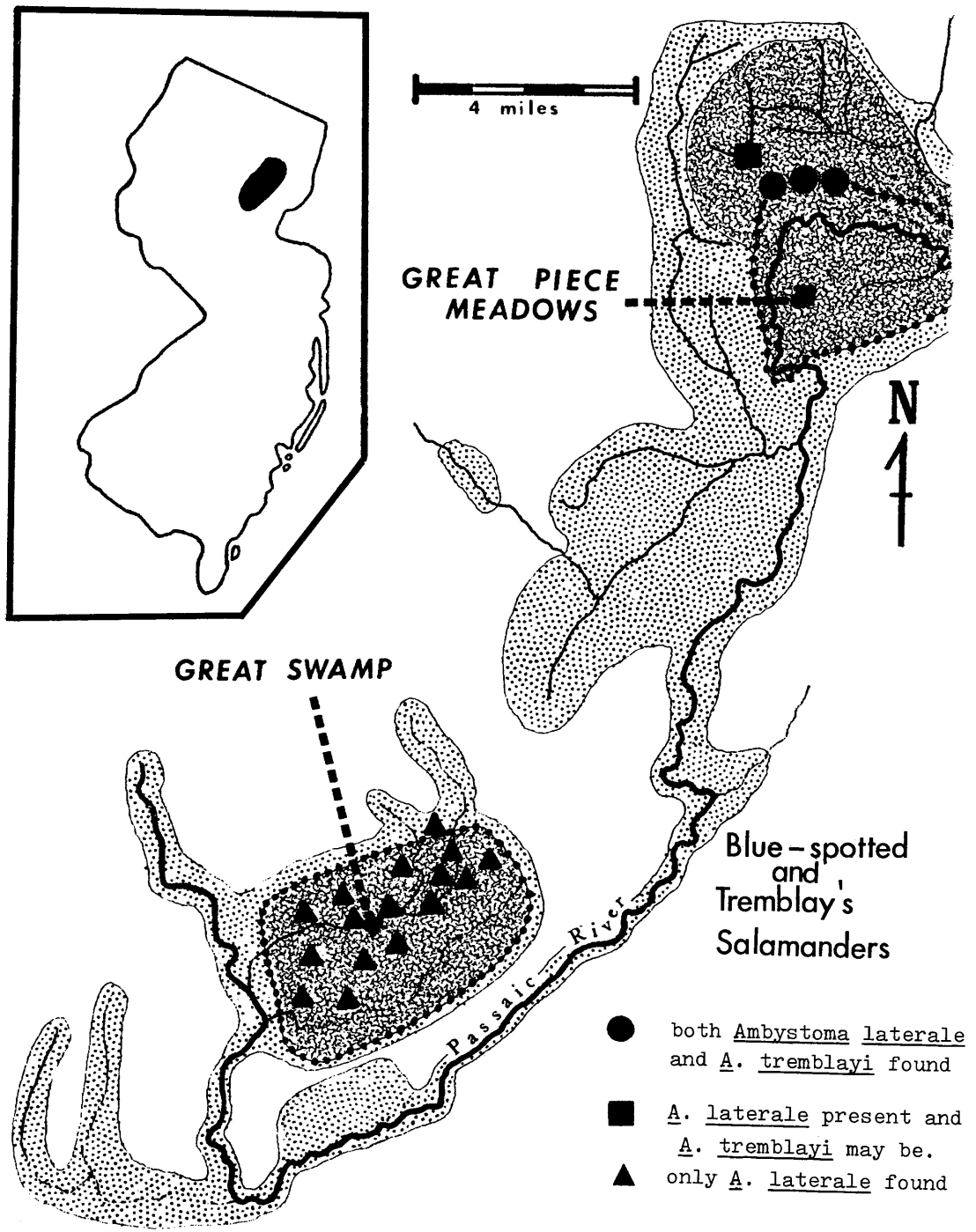

FIG. 1. Localities of *Ambystoma laterale* and (preliminary results) *A. tremblayi* in New Jersey.

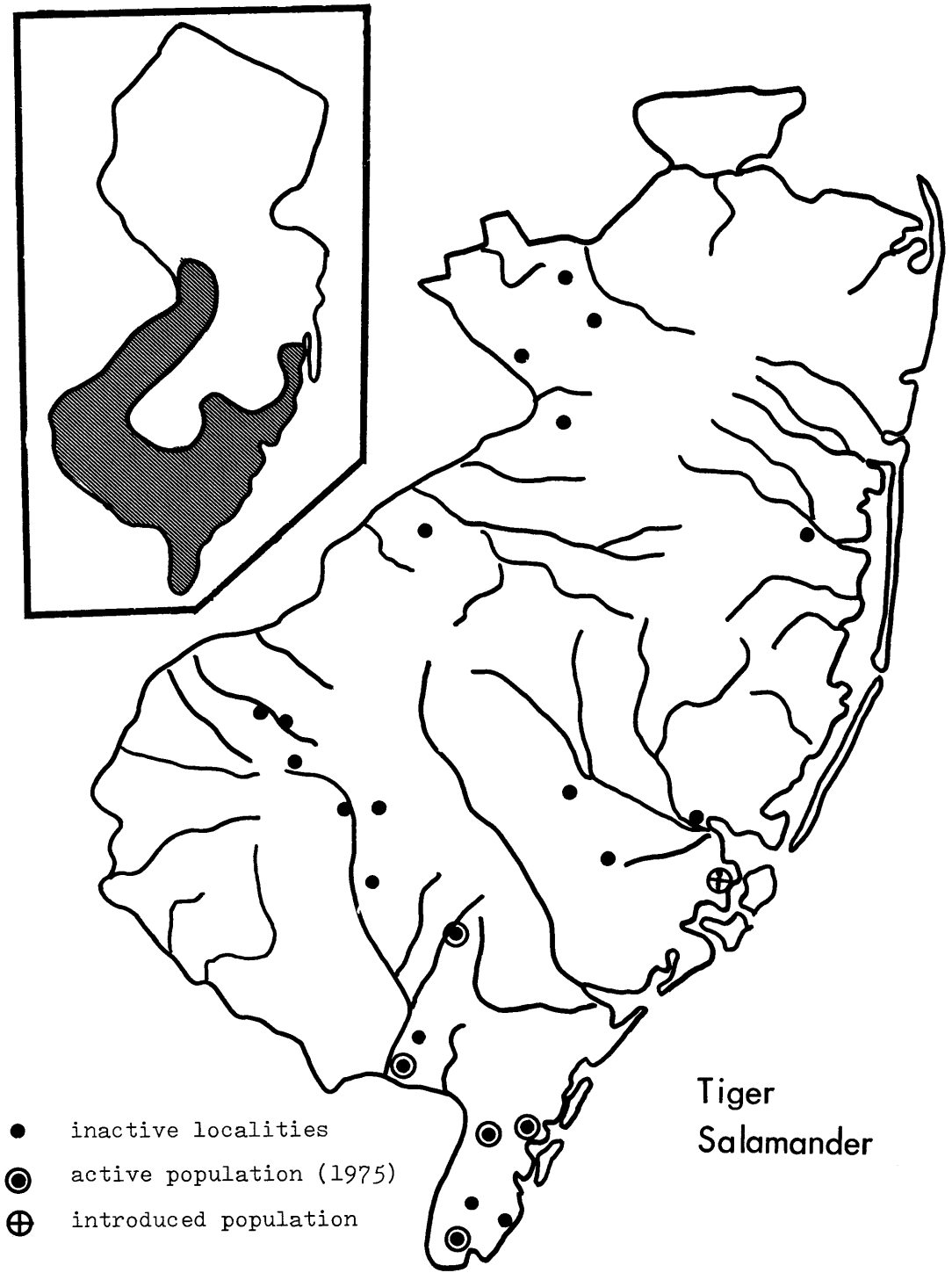

FIG. 2. Populations of *Ambystoma t. tigrinum* in New Jersey.

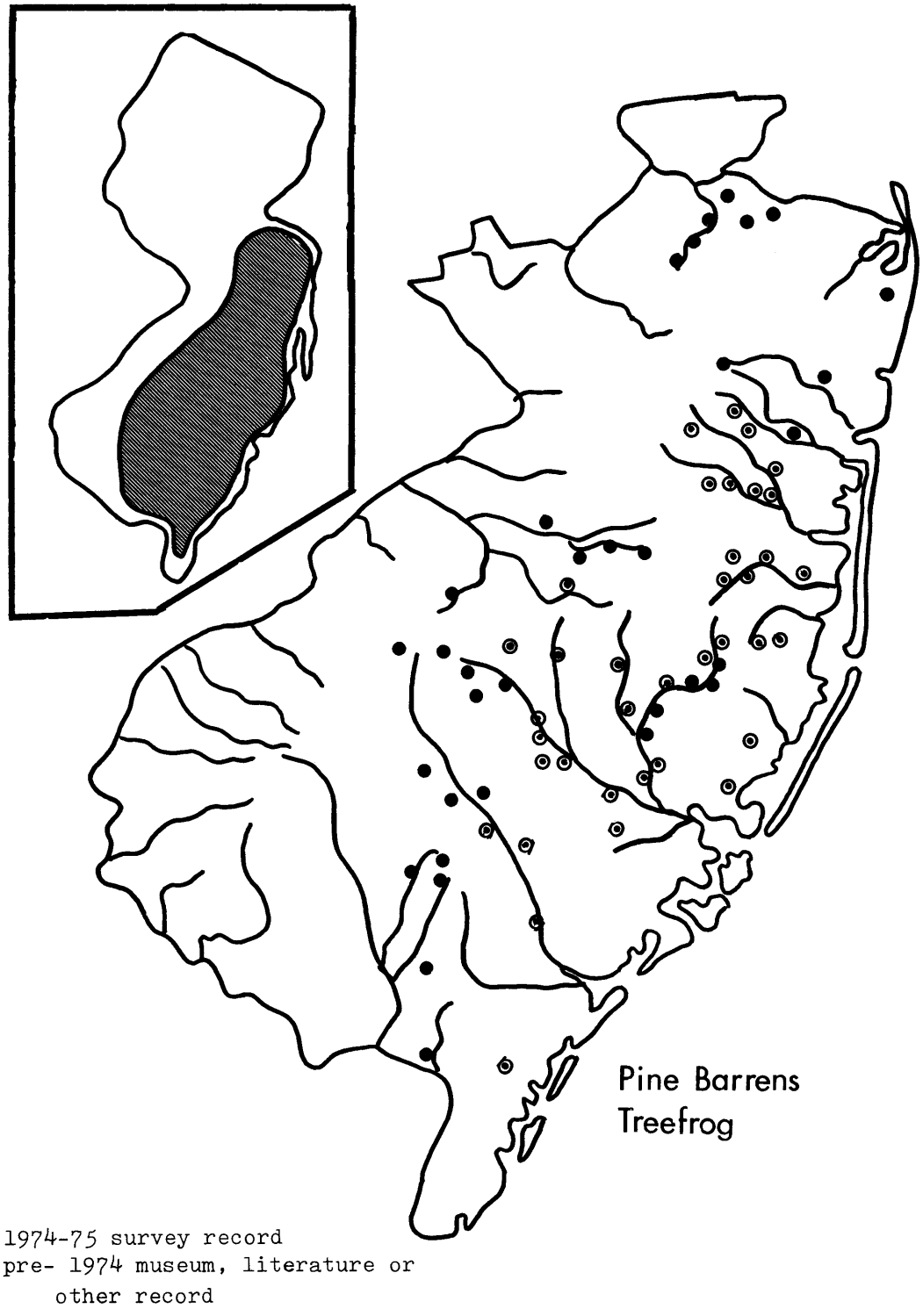

FIG. 3. *Hyla andersoni* in New Jersey.

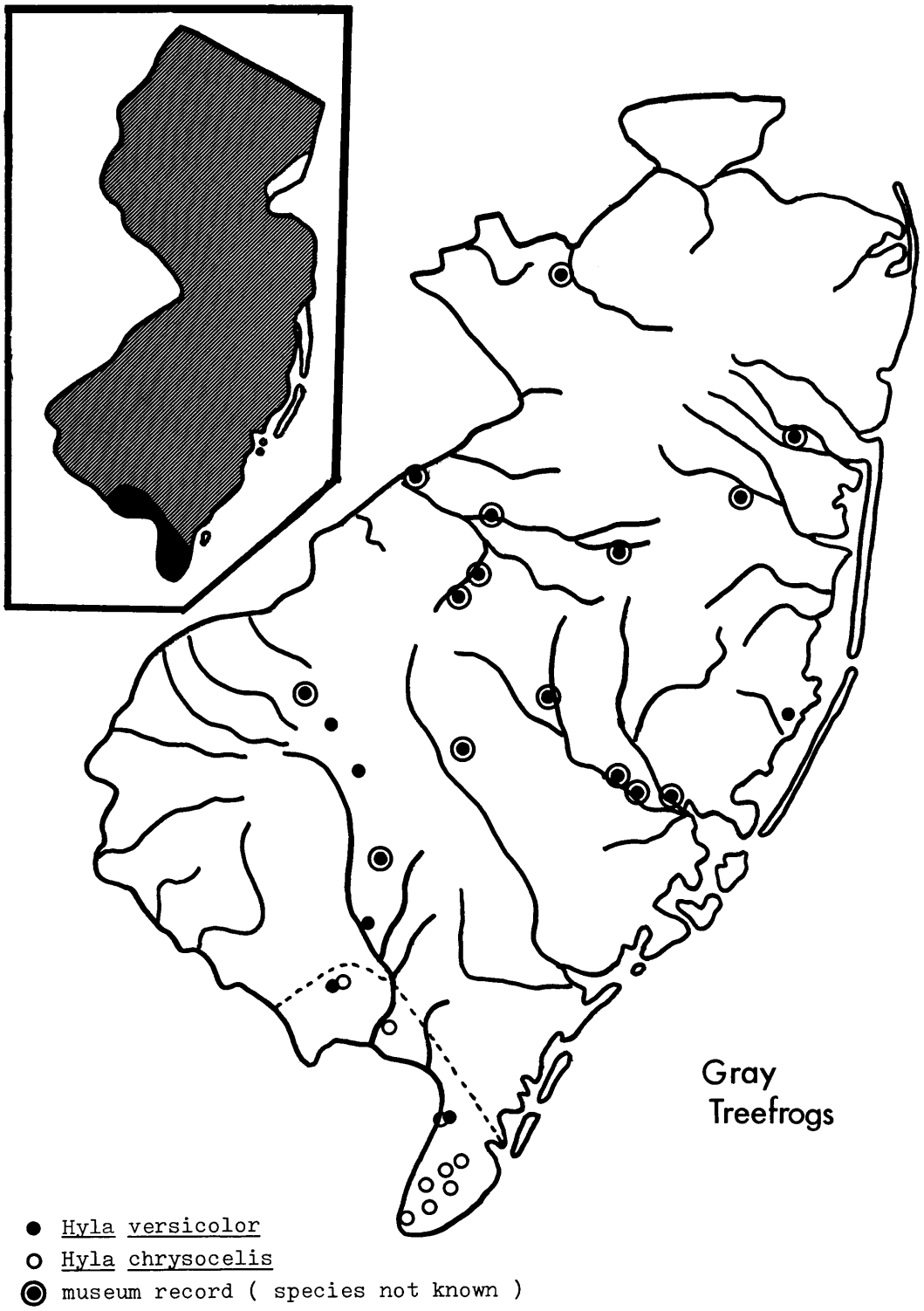

FIG. 4. Known localities of *Hyla chrysoscelis* and *H. versicolor* in New Jersey.

ponds and swamps are still extant. The nonbreeding habitat is deciduous mixed woods near a breeding area — both are essential.

Hyla versicolor — Gray Treefrog

This species is morphologically identical to *Hyla chrysoscelis*. The two species can be distinguished by differences in the pulse rate of the mating call (Conant, 1975). *Hyla versicolor* occurs commonly throughout northern New Jersey but occurs only in disjunct and sparse populations along the periphery of the Pine Barrens (Fig. 4).

The breeding habitat in southern New Jersey is similar to that of *Hyla chrysoscelis*. These small scattered populations are intolerant to human disturbances, especially habitat alteration and collecting pressures.

Clemmys muhlenbergi — Bog Turtle

Although locality records are found throughout the state, the distribution of this animal is actually discontinuous; the species exists in isolated pockets of highly specialized habitat.

The optimal habitat of *Clemmys muhlenbergi* is accurately described by Ernst and Barbour (1972) as "sphagnum bogs, swamps and marshy meadows having clear, slow moving streams with soft bottoms." Commercial and amateur collecting are a definite threat to this species, but habitat destruction is by far the most significant factor in its demise.

CONSERVATION RECOMMENDATIONS

Ambystoma laterale

A. Great Swamp Vicinity
   1. Populations on the Great Swamp National Wildlife Refuge are reasonably safe but must be continually monitored.
   2. Additional localities outside the refuge should be sought, identified and protected.
B. Great Piece Meadows
   1. Breeding sites must be identified and protected.
   2. Potential habitat in the area must be protected.
C. Bog and Vly Meadows
   1. Breeding sites must be identified and protected.
   2. Potential habitat in the area must be identified and protected.
D. Other areas
   1. Additional isolated populations may exist throughout the Lake Passaic Basin. They should be located and protected. Possible sites are: Troy Meadows, Black Meadows, Lee Meadows and Hatfield Swamp.
E. Collecting
   1. All collecting must be banned unless it directly relates to the protection, preservation or increase of the species.

Ambystoma tremblayi

A. If this salamander occurs in the Great Piece Meadows, as preliminary results indicate, then all known breeding and nonbreeding habitats must be preserved since this would be the only known location for this species. The Blue-spotted salamander would also be sympatric at this location.
B. Additional searching must be done to determine if this species occurs elsewhere.
C. All collecting must be prohibited unless it directly relates to the preservation of the species and its habitat. Even this must be done with caution.

Ambystoma tigrinum

A. All populations must have immediate protection from collecting and habitat alteration. The loss of even one or two locations could mean the extinction of the species in New Jersey. Some of the breeding ponds are in gravel pits that are being currently worked. Arrangements must be made with the companies involved to maintain at least a few ponds undisturbed.
B. Recolonization efforts must be initiated, preferably close to known populations in order to firmly establish the species. This should be done on protected land to insure success.

Hyla andersoni

A. Habitat Preservation
   1. There must be preservation of large tracts of undisturbed Pine Barrens to insure continuous distribution of the species.
   2. Breeding or nonbreeding habitat must be protected whether or not it is isolated.

3. The Pine Barrens aquifer must remain undisturbed.

B. Collecting
   1. All commercial and amateur collecting should be prohibited.
   2. Possession of this species, except by permit, must be prohibited.
   3. Permits for collecting or study of this species must be carefully regulated.

Hyla chrysoscelis

A. All known localities must be preserved.

B. Some of the breeding ponds are in gravel pits that are now being worked: an arrangement must be made with those companies involved to maintain at least a few ponds undisturbed.

Hyla versicolor

A. No special protection is necessary in northern New Jersey.

B. Below 40 degrees North Latitude *Hyla versicolor* must be given full protection.

C. Collection of any Gray Treefrog (*Hyla chrysoscelis* or *H. versicolor*) must be banned.

Clemmys muhlenbergi

A. Habitat Preservation
   1. Any location, regardless of size, having a population must be left intact.
   2. Any potential bog turtle habitat must be preserved.

B. Collecting
   1. All collecting must be banned.
   2. Illegal possession or sale must be punished to the fullest extent of the law.

C. Recolonization
   1. Recolonization should be attempted in suitable habitat where populations have been extirpated.

D. Population Studies
   1. In order to predict the future of known colonies population studies are essential.
   2. Additional surveys must be made to locate and protect populations.

E. Land Acquisition
   1. We must begin to purchase or hold known localities not on protected lands.

ACKNOWLEDGMENTS

We would like to acknowledge the following for field assistance: Susan Anderson, William Fiore, Richard Forfa, Robert Kaplan, Clarke Keller, Salome Litwin, Allen Marchisin and Lawrence Williams. Joseph Lomax, Patrick Murphy and William Burkhead supplied locality information. We are grateful to the excellent staff of the Nongame and Endangered Species Project, especially Paul McLain and Robert Mangold. This research was supported by the Nongame and Endangered Species Project, New Jersey Division of Fish Game and Shell Fisheries, Department of Environmental Protection.

The coauthors (KAH, JMG and MJR) dedicate this report to the memory of James D. Anderson, who passed away during the preparation of this manuscript. Dr. Anderson had done much to try to insure the conservation and preservation of endangered species in New Jersey. We only hope their continued existence can act as a living memorial to him.

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