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WILDLIFE RESOURCE MANAGEMENT PLAN  
FOR WILDLIFE MANAGEMENT AREAS IN THE PINELANDS

PART I  
COMPREHENSIVE PLAN

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A. Purpose of the Report

The purpose of this report is to describe the present and planned wildlife management activities and administrative and recreational facilities development projects on Division of Fish, Game and Wildlife administered lands in the Pinelands. This report has been prepared at the request of the Pinelands Commission to facilitate a review of the development activities of the Division of Fish, Game and Wildlife in the Pinelands. Background is provided into the wildlife management and recreational goals, objectives and policies of the Division so that compliance with the Comprehensive Management Plan for the Pinelands may be interpreted in this context. (Note: the term "wildlife" is used throughout this report in its broadest sense including mammals, birds, fish, reptiles and amphibians.)

B. Administrative Authority and Mandate of Division of Fish, Game and Wildlife

The Division of Fish, Game and Wildlife was established "for the purpose of providing an adequate and flexible system of protection, increase, control and conservation of freshwater fish, game birds, game animals, and furbearing animals in this State, and for their use and development for public recreation and food supply" (Title 23, Section 2-2 and Title 13, Article V, Section 1B-30). The same section under Title 13 also states that "the council (Fish and Game Council) is hereby authorized and empowered to determine under what circumstances, when and in what localities, by what means and in what amounts and numbers such freshwater fish, game birds, game animals, and furbearing animals, or any of them may be pursued, taken, killed, or had in possession so as to maintain an adequate and proper supply thereof, and may, after first having determined the need for such action on the basis of scientific investigation and research (conducted by the Division), adopt and from time to time amend and repeal such appropriate and reasonable regulations concerning the same...".

Regarding nongame and endangered species Title 23, Section 2A-7 states that "the director (of the Division of Fish and Game) shall establish such programs, including acquisition of land or aquatic habitat, as are deemed necessary for the conservation and management of nongame and endangered species of wildlife".

C. Goals of the Division of Fish, Game and Wildlife

1. To manage the fish, and wildlife resources of the state to maximize their biological, economic and recreational values to the citizens of the state.
2. To preserve and enhance the habitat essential to maintain the diversity and optimum density of the fish and wildlife resources of the state.

3. To educate the public in the values and needs of the fish and wildlife resources and the role of fish and wildlife management in modern society.

D. Recreational Role of the Division of Fish, Game and Wildlife in the Pinelands

The role of the Division of Fish, Game and Wildlife and the areas under its administration in the Pinelands is to provide for the general public those recreational opportunities that are dependant on wildlife. The thrust of the Division's efforts in this regard is two pronged. First, through the setting of regulations, research and education efforts, the Division of Fish, Game and Wildlife attempts to protect and enhance the wildlife resources of the entire Pinelands region. The Division attempts to foster an understanding for and an appreciation of wildlife and encourage wildlife habitat management. In this way, wildlife-oriented recreation throughout the region is enhanced.

The second direction of the Division's efforts to provide wildlife-oriented recreation in the Pinelands is in the acquisition and management of tracts of land and associated waters for the enhancement and protection of the wildlife habitats therein. These areas are actively managed, within budgetary constraints, to produce maximum sustained yields of wildlife for enthusiasts of wildlife-oriented recreation. The Division of Fish, Game and Wildlife administers 19 areas covering 106,855 acres in the Pinelands National Reserve. This represents 10% of the Reserve. Nine Wildlife Management Areas are located in the state Pinelands Area, encompassing 70,379 acres. Total land and water area administered represents 12% of the Preservation Area and 5% of the Protection Area.

The number of people in search of wildlife-oriented recreational opportunities has grown tremendously in the last 20 years as shown in nationwide surveys conducted by the U.S. Fish and Wildlife Service (1965, 1970 and 1975, 1980). On a national scale, the number of hunters and fishermen increased from 45 million in the 1965 survey to over 77 million in the survey taken in 1980. An even greater increase was shown to have occurred in the nonconsumptive forms of wildlife-oriented recreation. Birdwatchers and wildlife photographers increased from 11 million in the 1965 survey to over 83 million in the survey taken in 1980. This trend is predicted to continue, at least on a statewide basis, according to the 1973, 1977 and 1984 Outdoor Recreation Plans for New Jersey produced by the Green Acres Program.

The amount of land available for the pursuit of wildlife-oriented recreation is declining. New Jersey is losing over 45 sq. mi. of wildlife habitat to development every year (Lund 1975). Most of this loss will now occur outside the Pinelands as a result of the preservation effort. Consequently, open space in the Pinelands, including Wildlife Management Areas, is becoming increasingly

important in meeting the public's wildlife-oriented recreational needs.

Much of the state's wildlife habitat, within and outside the Pinelands, is in private hands and is unavailable for public use. Kingsley (1975) found that 2/3 of the privately owned forest land in New Jersey was closed to access by the general public. The Wildlife Management Areas of the Pinelands not only protect and enhance wildlife habitat but provide a variety of additional benefits associated with open space for the citizens of New Jersey.

E. Wildlife Resource Management Activities in the State Pinelands Area

1. Introduction

The Division of Fish, Game and Wildlife has always managed the lands under its administration in such a manner as to protect the integrity of the ecosystem, of which the wildlife resource is an integral part, while enhancing its potential for wildlife-oriented recreation. Protection of the ecosystem and enhancement of its recreational potential are common goals of the Pinelands Commission and the Division of Fish, Game and Wildlife in the Pinelands. The Comprehensive Management Plan for the Pinelands reflects, in part, an effort to attain these common goals.

The Pinelands ecosystem can be managed to increase the recreational benefits derived from it by the people of the state while maintaining its overall ecological integrity. Indeed, without proper management, this ecological integrity could be destroyed. For example, fire suppression efforts in the Pinelands threaten its existing ecological communities necessitating the development of innovative land management programs in the region.

The retardation of vegetative succession is the primary aim of most of the terrestrial habitat management practices utilized by Division of Fish, Game and Wildlife in the Pinelands. A great majority of the wildlife species utilized by man for consumptive and nonconsumptive purposes depends upon early successional vegetative communities for, at least, part of its life cycle. Early successional communities also support higher density populations than mature communities. These types of communities were a much more prevalent part of the Pinelands landscape in the past due to the influence of wildfire. Fire produced a mosaic of successional stages which increased vegetative diversity and the quality of the habitat for wildlife. The need to control wildfire today has led to a decrease in diversity and an overall advancement of successional age which has decreased the value of much of the region for wildlife. Most of the terrestrial habitat management practices of the Division of Fish, Game and Wildlife attempt to compensate for the loss of wildfire as a means of impeding succession and increasing vegetative

diversity. In this way, habitat quality is restored and the ecological integrity of the region is protected.

The aquatic habitat management activities of the Division of Fish, Game and Wildlife are used to maintain, restore or improve the fisheries resource of the Pinelands. Various laws and regulations are regularly applied to protect the waters and their indigenous fish populations from degradation, and to prevent depreciation in their value to man. However, the chemistry of the Pineland's waters is extremely acid and poor in productivity. This is caused by surrounding soils which are low in fertility and bogs which generate acid conditions. The fish which survive in this type of environment grow slowly and provide little angling opportunity. Studies have shown that surface waters in the Outer Coastal Plain produce less than 70 lbs. of fish per acre. In contrast, the Inner Coastal Plain (outside the boundaries of the Pinelands) produce 200 to 300 lbs. of fish per acre. In order to provide a level of angling opportunity that is more attractive and capable of meeting the increasing needs of the state, management techniques must be applied where practical to increase fish production. Application of these techniques can improve fishing through increasing the production of native species or through allowing the introduction of other non-native game fish. It is not practical to apply these techniques to more than a small fraction of the surface waters of the Pinelands; natural factors make it infeasible to do more. Therefore, the natural character of the Pineland's waters and aquatic biota will not be changed except on small, specially situated and intensively managed sites that will not adversely impact the surrounding environment but will provide otherwise unavailable angling opportunities in the Pinelands Region.

It is hoped that general approval for the habitat management activities of the Division of Fish, Game and Wildlife in the Pinelands can be obtained and that the spirit of cooperation in working toward our common goals can continue.

## 2. Habitat Management Activities (current & proposed)

### a) Terrestrial Habitat Manipulation

#### a.1) Forest Management

Timber is harvested on Wildlife Management Areas to retard vegetative succession and diversify wildlife habitat. The production of timber is a secondary objective. Two basic zones of the Wildlife Management Area forests are managed: the interior and the field edges. In the interior zones, stands in advanced stages of succession are harvested by commercial woodcutters in blocks or strips that vary in size from one quarter to five acres. Presently, only oak is being harvested in this manner. Should



market conditions change, pine will also be included in this program as has been the practice in the past. Trunk sections of trees are removed but the tops and limbs are left to provide food and cover for a variety of wildlife species.

Mature woodlands that border fields are cut back a distance of 30 to 50 feet. This results in an "edge effect" where three habitat types (field, brush and forest) adjoin, resulting in increased habitat diversity and wildlife usage.

Each WMA is surveyed on an annual basis to determine where forest management will take place in the coming year. Since there is an administrative threshold of approximately 100 acres per year for this type management, areas which will benefit the most are chosen i.e. areas with least habitat diversity. If large unbroken tracts of mature, monotypic woodland exist, cuts are made in these areas first. If such areas do not exist, cuts are made adjacent to fields or previously harvested woodlands. In doing so, increased habitat diversification is attained. On WMA's where past logging or fires have left only a small percentage of mature woodland, timber is not harvested.

*Non-Game  
Concerns →*

Additional sighting criteria for forest management on WMA's are as follows:

-Woodlands adjacent to scenic corridors (roads, streams, lakes) are not harvested so that visual barriers are maintained.

-Wooded swamps are exempted except in certain situations where management is needed to encourage cedar regeneration.

-Land use on adjacent private land is taken into consideration.

Given the present age structure of woodlands on WMA's considerably more forest management would take place were it not for administrative constraints. Some upper limit for timber harvest on WMA's would, of course, be desirable, but in light of the dynamic nature of forest succession, this limit will not be approached in the foreseeable future. Under current management, the WMA woodlands are maturing at a much faster rate than they are being cut.

Approximately 60 to 70 acres of forest land are presently being harvested on the Wildlife Management Areas in the Pinelands on an annual basis. This

figure will vary from year to year with a possible maximum of about 100 acres in any one year in the foreseeable future. The maximum, 100 acres, represents a very small percentage of the acreage on Wildlife Management Areas in the Pinelands even on a cumulative basis. Approximately 15 acres of timber per year are harvested on Wildlife Management Areas in the Preservation Area.

All forestry operations will be conducted in accordance with the standards in Article 6 of the Comprehensive Management Plan. Notification will be given at the beginning of each year showing the location of all timber harvest areas as well as a description of the timber and method of harvesting for all areas over 1 acre. The Commission will be notified prior to the initiation of each individual timber harvest operation greater than 1,500 square feet.

a.2) Revegetation

Hedgerows and small groves have been established on WMA's in the past to increase habitat diversity, providing escape cover, travel lanes, and nesting sites for wildlife. Plantings are also made for the purpose of preventing soil erosion.

Tree and shrub seedlings are obtained from the New Jersey State Nursery and the 4-H Shrub Program sponsored by the Division of Parks and Forestry. All seedlings are planted on selected Wildlife Management Areas and have included but are not limited to: white pine, Norway spruce, Japanese black pine and hemlock. A mechanical transplanter is used to plant seedlings at four to six foot intervals. When terrain prohibits the use of a transplanter, they are planted by hand.

Autumn olive and tartarian honeysuckle, two popular wildlife shrubs, have been used in establishing hedgerows to break up large fields. The shrubs increase diversity and provide food and cover for wildlife. They are planted in double hedgerows at 1 to 3 foot intervals. A mechanical transplanter is used to plant these shrub seedlings.

Considerably less than 1% of Division of Fish, Game and Wildlife administered lands in the Pinelands have been effected by revegetation. Revegetation is not anticipated in future habitat management efforts except where necessary to prevent soil erosion such as along dike edges and in abandoned borrow pits. Native plant species will be utilized in all future revegetation projects on WMA's in the Pinelands.

### a.3) Field Clearing

Fields are cleared for the purpose of diversifying wildlife habitat. A bulldozer equipped with a root rake or straight blade is used to clear both over and understory. The vegetation and residue soil is pushed to the edges of the site forming long piles or berms. Twenty to 30 foot openings are left in the berms to permit access to the forest by forest fire fighting equipment. The exposed soil is then disked twice in a crisscross fashion with a large disk towed by a bulldozer. After the new field is prepared in the above manner, standard farming procedures (see next section) are initiated to establish annual or perennial herbaceous vegetation.

Up to 100 acres per year were cleared during certain periods in the past. In the last 5-6 years few new fields have been cleared due to the costliness of the operation coupled with a tightened budget. If the budgetary situation permits, up to 25 acres per year may be cleared in the future. Up to 300 of these acres would fall within the Preservation Area. For this to occur, funds must also be available for the maintenance of any new fields cleared. Field maintenance consists of any of the following techniques: fallowing, planting of annuals, planting of perennials and/or mowing of perennials.

New field clearing will take place primarily to expand existing field complexes designed to compliment put-and-take game bird liberation programs on Colliers Mills, Peaslee and Greenwood Forest WMA's. An exception to this is proposed field clearing for endangered species management on Greenwood Forest WMA in proximity to timber rattlesnake den sites.

Sites adjacent to roads, streams or private property holdings are not considered for field clearing nor does clearing take place in wetlands. Notification will be given of the location and size all new fields to be cleared.

### a.4) Field Maintenance

Fields on Wildlife Management Areas are kept at an early successional stage either by planting or mowing.

Approximately 1/3 of the fields on Wildlife Management Areas are planted each year by Division personnel or, on a lease basis by local farmers.

Fields vary in size from a quarter-acre to areas as large as ten acres. Both annual and perennial types of crops are planted. Field corn, oats, switch grass, sorghum, lespedeza, buckwheat, soybeans, clover, timothy, millet, wheat, rye and pasture mixtures are planted in spring or fall depending on species requirement. No pesticides are used.

The lease arrangement for contract farmers requires that 15% of the crop be left standing and that the recommended agricultural practices of the New Jersey Department of Agriculture, the Soil Conservation Service, and the New Jersey Agricultural Experiment Station at Rutgers University be utilized. This includes the addition of required lime and fertilizer.

If perennials are planted, this field is then mowed once a year from then on. Mowing serves to rejuvenate the perennial planting while retarding the encroachment of woody plants. Field mowing operations are conducted in late winter and early spring before wildlife nesting activities begin. A tractor-drawn rotary mower is used. Mowing may be limited to areas of woody vegetation encroachment.

Approximately 2/3 of the fields available for planting each year are left fallow. This practice provides nesting habitat for birds and maintains soil fertility.

Approximately 1,100 acres are annually subjected to this type of management on the Wildlife Management Areas in the Pinelands. Lime (1 ton/acre) and fertilizer (300 lbs./acre 14-7-7 or 100 lbs./acre 20-10-10) are applied to approximately 200 acres/year.

a.5) Controlled Burning

Controlled burning is used in New Jersey to reduce the occurrence of wild fires. This technique involves the ignition and burning of ground litter in a controlled situation to reduce the volume of fuel available in the event of a fire. Certain Wildlife Management Areas within the Pinelands are subjected to this management technique under the supervision of professional fire wardens of the New Jersey Bureau of Forest Fire Management. Controlled burns are timed to minimize conflicts with wildlife, and are usually conducted in late winter. A secondary effect of these fires, if properly conducted, is to improve wildlife habitat by

increasing the amount and nutritional value of wildlife foods and creating habitat diversity.

The number of acres subjected to this practice varies annually, depending on weather conditions, from 1,000 to almost 4,000 acres. Specific areas to be burned are those of high fuel accumulation recommended by the area fire wardens.

b) Aquatic Habitat Manipulation

b.1) Dam Restoration

One of the major objectives of the Bureau of Freshwater Fisheries is to provide for and protect fisheries habitat. Dam restoration projects can contribute significantly to this end. A dam restoration project is simply the repair or replacement of an existing water control structure which is no longer functional along with repairs to its associated dike. Dam restoration restores a lake or impoundment to its former water level. When this occurs, aquatic habitat is restored thus providing for restored fish production and angling opportunity as well as other forms of open water recreation. The Division of Fish, Game and Wildlife must comply with a number of permit application procedures to undertake a dam restoration project. While the intent of this type project is merely to restore impoundments, it must be recognized and consideration given to the fact that new criteria for dam construction as imposed by regulatory agencies will prevent identical replacement and require measures that may cause limited encroachments on wetlands. This type activity will effect only a very limited area within the Pinelands and damage to wetlands within these areas will be minimized to the greatest extent practicable and mitigated where possible.

Dam restoration project will be initiated, within economic constraints, at all sites where the water control structure is no longer functional or declared unsafe. The Division will give high priority to impoundments that provide, or have the potential for providing, substantial recreational opportunity to anglers.

The Division intends to restore only five impoundments in the Pinelands in the foreseeable future. These sites are located on the following areas: Howardsville Bogs-Greenwood Forest Wildlife Management Area (one impoundment), and Upper Tuckahoe River - Peaslee Wildlife Management Area (four impoundments).

b.2) Construction of Off-Stream Impoundments and Ponds

The objective of this type of project is to create new areas of habitat which will be managed for gamefish species. It will ultimately lead to more man-days per acre of freshwater angling and increase the opportunities for other forms of recreation associated with open water. This type of project can be accomplished by two entirely different techniques. The first technique utilizes physical structures which divert flow from a reservoir impoundment to maintain off-stream impoundments. The off-stream impoundments are formed by construction of dikes and spillways, with flow being diverted from the reservoir via manifold ditch or piped under ground. Only sites which were previously impounded by a series of dikes will be given consideration for this type of management.

The second technique is to dredge ground water table ponds. This is a very successful technique in South Jersey because of the shallow water table. However, the level of the impoundment will fluctuate with the ground water table. There is no need for diversions or spillways with this technique.

The construction of several off-stream impoundments may be considered along the Upper Tuckahoe River in the Peaslee Wildlife Management Area of Cumberland County. Implementation of this project will depend upon funds from outside sources. No plans currently exist for the construction of ground water table ponds in the Pinelands.

b.3) Water Level Management for Waterfowl

Selected ponds, lakes and impoundments on various Wildlife Management Areas are subjected to water level management. This technique involves the lowering and raising of water levels at various times of the year to both reduce problem vegetation and encourage vegetation beneficial to waterfowl. Water levels are lowered by removing spillway boards or opening flood gates in the spring of the year. Water levels are raised in late summer or early fall. Emergent plants such as wild millet, spike rush and other natural vegetation are encouraged in this manner.

All areas with the potential for management of this type will be subjected to it within the constraints of time and manpower. Only those areas which have, or have had in the past, water control structures have potential for water level manipulation.

Primarily, these are abandoned cranberry production areas. In addition to a control structure, an impoundment must have a bottom configuration that allows water levels to become shallow enough to encourage native aquatic emergents while still maintaining a sufficient surface area of water.

At present, water level manipulation for waterfowl is occurring only at Stafford Forge Wildlife Management Area. Three additional areas have potential for management of this type and will be considered if and when their water control structures are restored. They are located on Greenwood Forest, Peaslee and Colliers Mills Wildlife Management Areas.

b.4) Water Level Management for Fish

Water level management is also a fisheries management technique used for controlling abundant populations of forage species such as the bluegill sunfish (Heman, Campbell and Redmond 1969). The water level is, primarily during the fall season, lowered below the littoral zone of the impoundment and remains that way for up to two months. This helps to prevent overpopulations of forage fish, since it allows predators access to them, and accelerates the growth of the predator fish species that are a major objective of pond management (e.g. largemouth bass) (Wegener and Williams 1974, Hill 1980 and Dunst 1974).

The short duration of drawdown does not significantly effect submersed rooted aquatic plants (Bennett 1970). Control of aquatic plants could be accomplished by leaving the water level in the impoundment lowered for the winter season to expose the aquatic vegetation to thawing and freezing stresses.

The effect drawdown has on invertebrates depends upon the species involved and how motile they are. Species which are poor swimmers will be stranded as the water recedes (Bennett 1970). Davies (1981) found that the benthic population in a public fishing lake was not significantly decreased after drawdown. In fact, the species identified before drawdown increased after the water level was dropped. None of the benthic invertebrates found prior to the drawdown were decreased in number or totally eradicated by the drawdown, although the depth distribution of some groups was slightly altered.

The goal of this technique is to manage water levels to accelerate the growth of predator species such as the largemouth bass and prevent the overabundance of forage species such as bluegills (Heman, Campbell and Redmond 1969)

This technique is utilized, as needed, on all impoundments with suitable water control structures which are not managed for waterfowl production, within the constraints of time and manpower.

b.5) Liming

Liming involves the direct application of hydrated lime to the water. The alkalinity and pH of the water are closely monitored before and after the application. When the results show a significant increase of alkalinity and pH to the desired levels, (6.5 - 8.0) the initial project is complete. Subsequent maintenance applications of crushed limestone are made only as necessary, usually at intervals of three to eight years. While liming alone may produce the desired results, it is an essential prerequisite to deriving further benefits from applications of inorganic fertilizer if needed.

The fisheries management technique of liming will change water quality by increasing total alkalinity and pH (Bennett 1970). The net effect of changes in water quality following liming is an increase in phytoplankton productivity which, in turn, leads to increased fish production (Boyd 1979).

Oak Pond, a borrow pit pond located on Winslow Wildlife Management Area in Camden County has recently been limed in accordance with a permit issued by the Pinelands Commission. An additional experimental pond in the Protection Area may be considered for liming at some point in the future. This project will be initiated only if a research program is established to evaluate the on-site and off-site impacts on native flora and fauna and ground and surface water quality.

Additional research should be conducted into the impacts of liming on ecosystems adjacent to the target area, as well as the impacts on fisheries production and recreational use. As suggested by the Division of Water Resources, this research would benefit both the Division of Fish, Game and Wildlife and the Pinelands Commission and make for a scientifically based policy in the future. This research would also have a much wider applicability



for fisheries management in impoundments and groundwater table ponds outside the Pinelands.

b.6) Fertilization

This management technique is implemented to increase the productivity of the water for fish production.

Fertilizer is applied, where appropriate, after the water has been limed. The water is limed first to increase carbon dioxide and bicarbonate ion concentrations. Liming increases total alkalinity, which in turn, reduces the amount of phosphorous absorbed by the native soil material on the bottom of the pond. Phosphorous, a component of commercial fertilizer, is considered the primary limiting nutrient in freshwater systems. After lime has been applied and the acidic bottom soils neutralized, phosphorous increases in availability for phytoplankton (the base of the food chain) production. Fertilizers are applied directly to water in quantities calculated by established formulas.

Oak pond (Winslow WMA) has recently been fertilized in accordance with a permit issued by the Pinelands Commission. Future use of this technique will be limited to one pond in addition to Oak Pond subject to the same conditions required for liming.

b.7) Aquatic Vegetation Control

The objective of aquatic vegetation control is to condition a body of water so that it can provide for all its potential functions. All aquatic systems need a limited amount of vegetative growth. If aquatic vegetation becomes too abundant, it is detrimental to some organisms which inhabit the system and to its use by humans for recreational purposes. For example, excessive vegetation overly protects smaller fish and causes stunting in predator species. Also, it accelerates eutrophication and the filling in of impoundments, and can prevent or reduce angling opportunity.

There are three techniques used to manage aquatic vegetation. The first method involves direct application of herbicides to kill the problem species of vegetation. The second method involves mechanical removal by a harvesting machine. The final method involves freezing that is accomplished through lowering of the impoundment during the fall and refilling in the early spring. Waters are drawn off until they are below the depth of the aquatic vegetation. The vegetation is then exposed to drying,

freezing, and thawing; a process which can reduce its abundance or eliminate it.

The following criteria is used to decide where aquatic vegetation control is warranted:

- 1) Vegetation covers an area of the pond to the extent that fishing, boating or swimming are significantly impaired.
- 2) Growth and/or the production of game fish is impaired by inadequate access to forage fish.
- 3) The herbicide required to control the vegetation is compatible with other uses of the water within the range of treatment.

Colliers Mills Lake was drawn down during the winter of 1984-85 to attempt to control vegetation by freezing. Additional water bodies may be considered in time as levels of lake use change and/or aquatic vegetation intensifies due to eutrophication.

b.8) Dredging Operations on Existing Impoundments

The objective is using this management technique is to restore impoundments to their original condition and human use potential. This technique is used on impoundments that have filled in and become eutrophic over time. Many impoundments in the Pinelands have become excessively shallow and carry a significant organic matter load. This typically results in problems with low dissolved oxygen, abundant aquatic vegetation, and reduced species diversity and angling opportunity. Dredging by hydraulic or drag line is the only way by which these impoundments can be restored. Spoil material would be spread on adjacent uplands and incorporated into the native soil or removed to more suitable locations.

The following criteria will be used by the Division to determine the need to implement any dredging program:

- 1) Excessive shallowness and/or organic matter accumulation on the bottom of an impoundment to the extent that recreational uses and/or fish production are impaired as manifest in the form of a) excessive growth of macrophytes (plants). b) Severe diurnal fluctuations in dissolved oxygen concentrations. c) Reduced fish species diversity.

Funding for dredging projects is not currently available. If funds become available, Colliers Mills Lake has priority.

b.9) Construction of Fishways

Fishways by law (NJSA 23:5-29.1) are required for dams or other man-made obstructions to the free upstream and downstream movement of fish. Generally, but not exclusively, a fishway is required in all obstructions that block, or could block, the passage of anadromous clupeids (American shad, alewife and blue back herring) yellow perch, brook trout and other species for which fish passage is required for life cycle requirements and/or maintaining or enhancing resource production or values.

The Division has no immediate plans to construct fishways on any Wildlife Management Area in the Pinelands.

b.10) OMWM

Open Marsh Water Management (OMWM) is a technique utilized on certain types of salt marsh to control mosquitoes. In doing so, the need to utilize insecticides is eliminated and the tidal food web is enhanced. This technique is carried out by the various County Mosquito Commissions in cooperation with the Division of Fish, Game and Wildlife and the Rutgers University Entomology Department.

There are three basic alterations used in OMWM: tidal ditches, ponds and radials. Most of the time the alteration selected depends on the distribution of breeding depressions and their proximity to tidal ditches or natural ponds. Sometimes, when water surface is lacking, ponds should be encouraged. When numerous natural ponds are present, pond radials and ditches are preferred.

OMWM is confined to areas of heavy mosquito breeding, that is the Spartina patens or mixed S. patens - short S. alterniflora marshes or types of similar elevation that are irregularly flooded by rains, spring or storm tides. This technique is never used in marsh types that do not breed mosquitoes.

OMWM has been completed on all Wildlife Management Areas in the Pinelands where the applicable salt marsh types occur.

b.11) TRSHI

This management technique, "Tidal Restoration of Salt Hay Impoundments" (TRSHI), is utilized to restore diked areas of salt marsh to tidal influence. The dikes, which were erected in the past to facilitate the harvest of salt hay (*S. patens*), are destroyed, restoring the former productivity of the marsh. The recreational value of the marsh for hunting, fishing, crabbing and bird watching is thereby regained.

TRSHI has been conducted on Heislerville and Dennis Creek Wildlife Management Areas. Work of this type is not anticipated outside the Pinelands National Reserve.

The Comprehensive Management Plan permits wildlife management activities in wetlands provided significant adverse impacts on the ecological integrity of the wetland is avoided. Many of the above aquatic habitat manipulation activities may be interpreted as having a significant adverse impact as outlined in Section 6-107 of the Plan. However, in all cases, it is the opinion of the Division of Fish, Game and Wildlife that the substantial increases in recreational opportunity provided through habitat management far outweigh any negative impacts. Management activities in wetlands are extremely limited in scope and, in most cases, occur in habitats already substantially altered by man (e.g. impoundments, former borrow pits, etc.).

A summary of the habitat management activities being conducted on each Wildlife Management Area in the Pinelands is provided in Table 1.

#### c. Development Review

The Division of Fish, Game and Wildlife protects important wildlife habitat throughout the Pinelands from the adverse impacts of development through the review of permit applications under the CAFRA, Riparian, Wetlands, Stream Encroachment and Waterfront Development laws. Important projects not covered by the above legislation are also reviewed as they are proposed to assure that significant adverse impacts on the state's wildlife populations are avoided.

### 3. Species Management

#### a) Introduction of Non-Indigenous Species

##### a.1) To Establish Viable Populations

Table 1: Habitat Management Activities on Wildlife Management Areas in the Pinelands National Reserve.

Current = x  
Proposed = 0

	Water Level Management	Forest Management	Field Maintenance	Field Clearing	Revegetation	Dam Restoration	Controlled Buring	Cons. of Off-Stream Impoundments	Liming	Fertilization Aquatic Veg. Control	Dredging	Const. of Fishways	Stream Structures	OMM	TRSHI
* Absecon															
* Beaver Swamp	0	x													
Colliers Mills	0	x	x	x			x			0	0				
* Dennis Creek			x												x
* Great Bay															x
Greenwood/Pasadena	0	x	x	x		0	x								
* Heislerville			x												x
* L.G. MacNamara	x	x	x								0				x
Manchester		x	x				x								
* Manahawkin	x	x	x												x
Peaslee	0	x	x	x		0	x								
Port Republic		x	x												
Stafford Forge	x	x	x				x								
Swan Bay															
* Whiting			x				x								
Winslow		x	x				x		x	x					
* Forked R.															
* Sedge I.															

\* NOT IN STATE PINELANDS AREA

Certain species are introduced into man-made impoundments in the Pinelands to establish viable populations. Management techniques such as liming and fertilization may be necessary to create conditions where the non-indigenous species can survive and reproduce. Non-indigenous species have been introduced by the Division of Fish, Game and Wildlife into only one area in the Pinelands in the last 10 years. Largemouth bass, redear sunfish, bluegills and fathead minnows were introduced into Cedar and Oak Ponds at Winslow Wildlife Management Area in 1970 and 1971. Both ponds were limed and fertilized at that time. These species have become established in both ponds. Largemouth bass were introduced into Colliers Mills Pond at some unknown point in the past. They have become established there and do well without habitat management.

Current plans call for the establishment of bass and sunfish populations in the Upper Tuckahoe River impoundments should they be restored. The introduction of non-indigenous species to establish viable populations is generally discouraged other than in certain artificial aquatic ecosystems where these populations can be contained.

a.2) To Supplement Established Populations

The Division of Fish, Game and Wildlife makes supplemental stockings of established fish species to restore populations that have been depleted due to various factors. Such practices are undertaken only on an as-need basis and are necessary to maintain angling opportunity. This management practice is utilized on an as-need basis pending fish population surveys and evaluations.

a.3) For Recreational Purposes Only

The Division of Fish, Game and Wildlife releases certain non-indigenous species into the wild on what is referred to as a "put and take" basis. They are released to provide short-term recreational benefits to the hunters and fishermen of the state. The animals involved generally lack the ability to successfully establish viable populations in the wild.

Approximately 20,000 pheasants are liberated in the Pinelands during the hunting season on an annual basis. Carlson and Penkala (1972) found that 78% of these birds are harvested by hunters. Due largely to their lack of wariness, few of these pen-reared birds survive the winter. Band returns indicate

that survival to the next hunting season is a very rare occurrence. Long-term establishment does not occur.

Approximately 4,000 brook, brown and rainbow trout are stocked in the Pinelands each year at two locations. These are Hammonton Lake and Toms River. Studies have found that these species survive for only a short period to time after liberation.

b) Introduction of Indigenous Species

b.1) To Establish Viable Populations

One of the goals of the Division of Fish, Game and Wildlife is to maintain the faunal diversity of the state. In this regard, attempts are made by the Division to re-establish species in the state which have been extirpated.

The first step in the restoration of a species is to determine whether sufficient habitat still exists to support the species. Aerial and ground surveys may be conducted to determine whether the food and cover requirements of the species are adequately met at all seasons. Historical background information is collected to determine what caused the extirpation and whether or not the situation still exists. The benefits of the reintroduction must be weighed against any possible negative impacts on other wildlife or the human population of the area. Public comment is solicited and educational programs conducted when a controversial species is involved. Other agencies whose land may be impacted by a reintroduction program are advised and their comments requested.

If it is determined that a reintroduction can and should be made, stock must be available whose requirements and tolerances make it a suitable candidate for survival in New Jersey. Generally, attempts are made to obtain stock from the nearest thriving population. Release sites are then chosen usually based on habitat quality. Possible negative impacts due to the proximity of human development, either on the reintroduced species or on people, may also be a major consideration in the choice of release sites.

In the Pinelands, attempts are currently under way to re-establish two species, the wild turkey and the peregrine falcon.

Wild turkeys last existed in the Pinelands in the late 1800's. In an attempt to re-establish them, fifteen wild birds, trapped in Sussex County, were released in the Pinelands in the winter of 1980. The initial release site was Peaslee Wildlife Management Area in Cumberland County. Since 1980, 183 additional wild turkeys have been released at 10 sites in South Jersey mostly within the Pinelands and this flock has grown to over 1500 birds.

A program to restore peregrine falcons to New Jersey began in 1977. This bird became extinct as a breeder sometime in the late 1940's or early 1950's. Although never a Pinelands breeder, peregrines could regularly be found here during migration. Six hacking towers were constructed in the Pinelands National Reserve at Brigantine, Manahawkin, Sedge Island Swan Bay, Tuckahoe and Heislerville. Young hatched at Cornell University were hacked and fledged from these towers. They returned to breed successfully for the first time in 1980 at two of the sites. Currently, successful breeding is occurring, in most years, at all the Pinelands towers and the peregrine population is firmly established here.

Two species are currently under consideration for possible re-establishment in the Pinelands by the Bureau of Wildlife Management. These are the black bear and the bobcat. In addition, the Non-Game and Endangered Species Project is considering the liberation of corn and pine snakes to re-establish populations in portions of the Pinelands in which they no longer occur.

4-

b.2) For Recreational Purposes Only

The Division of Fish, Game and Wildlife releases approximately 10,000 pen-reared bobwhites each fall on the Wildlife Management Areas in the Pinelands. Although a native species, pen-reared quail lack the native instincts necessary for survival in the wild. Carlson and Penkala (1972) found that 75% of these birds are harvested during the hunting season. Few, if any, survive until spring. Band returns indicate that none remain by the following hunting season. Interbreeding with native quail is probably rare. If it were to occur, the genes of inferior phenotypes would quickly be lost from the population.

c) Endangered Species

The Endangered and Non-Game Species Project of the Division of Fish, Game and Wildlife is responsible for the



management and protection of the endangered species of the state and the Pinelands under the Endangered Species Act of 1973. Inventories of endangered species locations are ongoing with protection afforded to critical habitats through development review. Law enforcement surveillance is also provided in critical endangered species areas. Research is conducted by project personnel on habitat needs and restoration potential of selected species on the endangered list.

Proposed management plans have been developed for all state endangered species with selected plans scheduled for implementation on an experimental basis.

d) Promulgation of Regulations

The Division of Fish, Game and Wildlife annually promulgates regulations governing the harvest of all wildlife species in all areas of the Pinelands. These regulations are designed to maximize the recreational and economic benefits to be derived from the wildlife resource of the Pinelands while protecting it for future generations to enjoy.

F. Facilities Development and Maintenance Activities

At the present time, no facilities development is taking place on any of the Wildlife Management Areas in the Pinelands. Current plans call for a new administration building at Winslow scheduled for completion in September 1988. In addition, the construction of four new administrative structures is being contemplated. These are a garage at Tuckahoe, and a new office, garage and storage building at Colliers Mills. It is doubtful that funding will become available for any of these projects in the foreseeable future. Any new administrative structures or additions will comply with all the provisions of Article 6 of the Comprehensive Management Plan.

Funds are currently being sought to match available federal monies to develop shooting ranges on some of the Wildlife Management Areas in the Pinelands. The Winslow and Tuckahoe tracts are currently under consideration for shooting ranges. In addition, the present range at Colliers Mills may be enlarged. Detailed plans of the sites and types of ranges to be built (trap, skeet, rifle, archery) have not been formulated as yet. Maximum land disturbance involved with the development of a range facility would be 10-15 acres. All provisions of Article 6 will be adhered to should ranges be developed.

Existing parking areas on the Wildlife Management Areas in the Pinelands are felt to be adequate for existing use. Should new Wildlife Management Areas be acquired, as is likely, parking areas will be established on them as needed? Parking areas are usually necessary at hubs of activity such as lakes, trailheads and are constructed by debrushing a small area capable of accommodating

5-15 cars and laying down a layer of gravel. Occasionally, larger areas are needed. Presently, the largest parking area on a wildlife management area in the Pinelands is located on Greenwood Forest and can accommodate up to 100 cars. Large parking areas are constructed in exactly the same manner as are smaller ones.

The restoration of dams and water control structures are planned for two wildlife management areas in the Pinelands. These are Peaslee (April Bogs), and Greenwood Forest (Howardsville bogs). These projects will be undertaken as funding permits and are the only ones of this type planned for the foreseeable future.

Every attempt is made in the development of a Wildlife Management Area to delineate its boundaries by posting signs around the edges of the property. In some instances these borders are cleared of brush but this practice involves less than 1% of the border area.

Maintenance activities on the Wildlife Management Areas can be broken down into four categories: road grading, dike and spillway repair, building maintenance, and trash removal.

Roads within Wildlife Management Areas are gravel and/or sand. They are kept smooth by scraping utilizing tractors equipped with grader blades. Occasionally gravel is laid down to fill in holes in heavily utilized management areas. A 3 acre pit is located at Stafford Forge, a two acre pit at Tuckahoe, four at Greenwood Forest and one each at Colliers Mills and Winslow that cover less than an acre apiece. Extraction schedules are variable from year to year depending on the need. Each pit will be reclaimed to the standards of Article 6 when extraction is terminated or when 5 acres in surface area are cleared so that no pits larger than 5 acres will exist.

Additional maintenance on Wildlife Management Areas includes repairs to dikes, dams and spillways including filling of breaches, clearing of clogged spillways and repair of vandalized water control structures. The balance of maintenance activities involves the upkeep of buildings and the removal of trash from designated receptacles and that trash generally strewn about the tracts.

## G. Recreation

### 1. Present Policies and Priorities

The primary management goal of the Division of Fish, Game and Wildlife on the lands it administers is to protect and enhance the wildlife resource to maximize the recreational and economic benefits to be derived from it. This is part of the legislative mandate of the Division. Recreationally, top priority is given to those activities dependent on wildlife. The reasons for this are threefold. First, there is a great demand for wildlife-oriented recreation in the state and a demand for areas managed primarily for this purpose. Secondly, the original organization which became the present

Division of Fish, Game and Wildlife was created by wildlife-oriented recreationists. Funding for the Division comes almost solely from this constituency. This funding has been used to purchase more than two-thirds of and maintain all of the Wildlife Management Areas in the Pinelands. Thirdly, as a natural resource oriented agency, the recreational expertise of the Division of Fish, Game and Wildlife lies mainly in the management of those activities dependent on wildlife.

With the passage of five successive Green Acres bond issues in New Jersey in 1961, 1971, 1974, 1978 and 1983, the general public has consistently expressed its desire to have lands set aside for recreation and/or the conservation of natural resources. Approximately one third of the land in Wildlife Management Areas in the Pinelands was purchased through these referenda.

In the opinion of the State Attorney General, statutory authority "sufficient enough to permit the Division (of Fish, Game and Wildlife) to promote or enhance activities other than hunting, fishing or trapping on Division lands", does not exist. Nonetheless, the present policy of the Division of Fish, Game and Wildlife is to permit recreational uses of Wildlife Management Areas that do not conflict with the priority wildlife-oriented uses. Examples of non-conflicting, non-facility-oriented uses are hiking, canoeing, sailing and cross-country skiing.

Financial constraints limit the amount of facility-oriented recreational opportunities that can be provided for even though they may be non-conflicting. Examples of facility-oriented recreational activities that may not conflict are swimming, picnicing and camping. If general funding were available for these types of recreational facilities on Wildlife Management Areas, they might best be administered by the Division of Parks and Forestry. The State Park Service does an excellent job of providing facility-oriented recreation on the lands it administers whereas the Division of Fish, Game and Wildlife possesses little expertise in this area. Arrangements as are currently in effect at Prospertown lake (Division of Parks and Forestry administers a swimming beach on a Wildlife Management Area) could be explored if funding becomes available.

Recreational activities that conflict with the priority uses of the Wildlife Management Areas are generally discouraged. Whether or not a conflict exists depends more on the time and place of an activity than the activity itself.

## 2. Present Use and Potential

Existing recreational use of the Wildlife Management Areas in the Pinelands is summarized in Table 2. Wildlife-oriented

Table 2: Existing and Potential Recreational Use of Wildlife Management Areas in the Pinelands National Reserve.

Existing = x  
Potential = 0

	Hunting	Trapping	Fresh Water Fishing	Salt Water Fishing	Hiking	Camping	Boating	Canoeing	Swimming	Ice Skating	Horseback Riding	Bicycling	Motorcycle ORV	Picnicing	Cross Country Skiing	Shooting Ranges	Archery Ranges	Birdwatching	Nature Study	Dog Trials	Snow mobilizing
Absecon	x	x		x			x	x										x	x	x	
Beaver Swamp	x	x	x		x	0		x		0		0	0	0		0		x	x	0	0
Colliers Mills	x	x	x		x	0	x	x	0	0	x	x	0	0	x	x	0	x	x	x	0
Dennis Creek	x	x		x			x	x					0					x	x	0	
Great Bay	x	x		x	x		x	x				x	0					x	x	x	
Greenwood/ Pasadena	x	x	x		x	0		x		0	x	x	0	x	0	0	0	x	x	x	0
Heislerville	x	x		x	x		x	x				x	0					x	x	0	
L.G. MacNamara	x	x	x	x	x	0	x	x	0	0	0	x	0		0	0	0	x	x	x	0
Manchester	x	x			x	0				0	0	0	0	x	0	0	0	x	x	0	0
Manahawkin	x	x	x	x	x	0	x	x		0	0	x	0	x	0	0	0	x	x	x	0
Peaslee	x	x	x		x	0	0	x	0	0	0	x	0	0	x	0	0	x	x	x	0
Port Republic	x	x		x	x	0	x	x		0	x		0	x	0	0	0	x	x	x	0
Stafford Forge	x	x	x		x	0	x	x	0	0	0	x	x	0	x	0	0	x	x	x	0
Swan Bay	x	x		x	x		x	x		0	x		0					x	x	0	
Whitings	x	x		x	x	0			0	0	0	0	0	x	0	0	0	x	x	0	0
Winslow	x	x	x		x	0	x	x	0	0	0	0	0	x	0	0	0	x	x	0	0
Forked R.	x	x		x									0					x	x		
Sedge I.	x	x		x			x											x	x		

types of recreation are, by far, the most extensive uses of the areas. The reason for this is that present management of the areas is directed toward the improvement of conditions under which this type of recreation can be enjoyed. Management of these areas has produced some of the best areas in the Pinelands to hunt, fish, trap, birdwatch and observe free-ranging wild animals. Use of the areas during the hunting season is extensive. Limits on the number of hunters using the Port Republic Wildlife Management Area had become necessary in recent years to preserve the quality of the experience. Despite the predominance of wildlife-oriented recreation on Wildlife Management Areas, Applegate (1974) found that about one-third of the use of Assunpink Wildlife Management Areas came from recreational activities not dependent on the wildlife resource (hiking, pleasure driving, jogging, picnicing, and boating).

Separately, each activity did not amount to a great deal of use, but collectively they accounted for approximately 20,000 visitors per year at Assunpink. We consider this to be typical of the Wildlife Management Areas in the Pinelands. These non-wildlife oriented recreational opportunities result simply from the administering of open public land to which access has been provided.

Potential exists on all the Wildlife Management Areas in the Pinelands to provide a variety of non-wildlife-oriented recreational opportunities that may not conflict with the priority use of the areas (Table 2). Fulfillment of this potential depends entirely on whether or not the public is willing to provide the necessary funding. Swimming and camping are two potential recreational activities that are expensive to develop and maintain and for which funding is not presently available. Additionally, the Division of Fish, Game and Wildlife lacks the expertise necessary to adequately provide for these types of recreational opportunities. The aid of the State Parks Service will be necessary in the design, planning and, perhaps, the administration of swimming and camping facilities on Wildlife Management Areas should funding become available.

Picnicing is another recreational activity for which there is potential on many of the Wildlife Management Areas. Facility development is not nearly as expensive as in swimming and camping areas. If funding were available for development and maintenance of picnic areas, they might also be administered by the State Parks Service.

There is potential on many of the Wildlife Management Areas to provide facilities for the target shooting sports. Matching funds are currently available through the Pittman-Robertson federal excise tax on sporting arms for the construction of such facilities as trap, skeet, rifle and archery ranges. Current plans call for the development of these type

facilities at three or four wildlife management areas in the Pinelands in the near future. Expertise currently exists within the Division for their administration.

Many of the Wildlife Management Areas have the potential for trails (foot and horse) so that a structured type of hiking or riding experience can be provided. If funding becomes available, the recommendations of the Division of Parks and Forestry will be sought regarding the siting, construction and maintenance of trails. The Division of Fish, Game and Wildlife will cooperate fully with the efforts of the State Parks Service to link trail systems throughout the Pinelands region.

### 3. Use by Handicapped

All buildings utilized by the public on Wildlife Management Areas in the Pinelands are accessible to the handicapped. All new public buildings will be designed accordingly. Special regulations allow the handicapped to shoot or hunt from a standing vehicle thereby providing them access to this recreational opportunity. Many fishing areas on Wildlife Management Areas in the Pinelands are accessible to the handicapped although no special provisions have been made. Fishing piers designed especially for access by the handicapped, such as the pier at Prospertown Lake, are contemplated for several Wildlife Management Areas in the Pinelands as funding sources become available.

## H. Policies on Use for Research and Teaching

Wildlife Management Areas are ideal study sites for scientific research in the natural sciences particularly as related to the wildlife resource. Use of this type, by qualified individuals, is encouraged. A special use permit is required. Recent research projects on Wildlife Management Areas include population and disease studies of raccoons at Colliers Mills by a Masters candidate at Cook College, and a study of factors effecting acorn production in scrub oaks at Manchester Wildlife Management Area by a professor of wildlife biology also from Cook.

The wooded areas of the tracts receive little use outside of the hunting seasons. These areas are ideal for use as outdoor classrooms for elementary school, high school and college level courses in the natural sciences. Although this type use of the Wildlife Management Areas is also encouraged, it occurs to only a very limited extent on the tracts in the Pinelands.

## I. Land Acquisition Policies

### 1. Existing Wildlife Management Areas

- a. The acquisition of interior exceptions within existing Wildlife Management Areas is a priority.

- b. The acquisition of land which extends the boundaries of existing Wildlife Management Areas to easily identifiable landmarks (roads, etc.) is a priority.
  - c. Acquisition of areas of unique or diverse habitat adjacent to existing Wildlife Management Areas is a priority.
2. New Wildlife Management Areas
- a. Areas containing high vegetative diversity are desirable.
  - b. Areas containing water (lakes, rivers, streams) or lowland areas (swamps, bogs, marshes) are desirable.
  - c. Existing physical facilities which complement the intended use of the area such as boat ramps, agricultural fields, etc. are desirable.
  - d. Plans for future residential or commercial development adjacent to a proposed Wildlife Management Area will seriously decrease its desirability.
  - e. A desirable size for new upland areas will be 2,000 acres or more.
  - f. No minimum size limit exists for water or lowland areas or for endangered species habitat. These areas are desirable regardless of size.

Given the shrinking land base in New Jersey and the increasing demand for wildlife-oriented recreation (as detailed in Section C), the Division of Fish, Game and Wildlife will need to significantly increase the size of the Wildlife Management Area system to meet future demands for this type of recreation. The Pinelands legislation may offer the last chance to acquire large new additions to this system.

J. Summary of Proposed Development in the Pinelands National Reserve

The 150,000 acre Wildlife Management Area (WMA) system in New Jersey plays two major roles. The first is the protection of wildlife habitat throughout the state. The second is the maintenance of open space that is accessible to the general public for the enjoyment of outdoor recreation. Both wildlife habitat and accessible land are disappearing at a rapid rate in New Jersey.

Given the major functions of the WMA system, little development of these areas is necessary. Although some habitat and facilities development does occur, it is neither desirable nor economically feasible to develop these areas to more than a minimal extent. Intensive habitat management occurs in some very limited areas but this is the exception rather than the rule. Twenty years from now, the WMA system will appear very much as it does today.

Terrestrial habitat management on the WMA's in the Pinelands is confined largely to timber harvest operations effecting less than 100 of the 94,000 acres per year. At this rate, the WMA forests are aging much more quickly than they are being cut. The overall age structure of these forests can be expected to increase over the next twenty years.

Up to 500 acres of additional fields may be cleared on the Pinelands WMA's in the next decade or two adjacent to the existing field complexes at Greenwood Forest, Colliers Mills and Peaslee. Funds must be available to maintain any new fields before they are cleared. It is not currently clear whether this will be the case. Presently, 1,600 acres of fields are, and will continue to be, maintained by semiannual mowing or planting.

The only additional terrestrial habitat management contemplated for the Pinelands WMA's in the foreseeable future is controlled burning in areas recommended by the Bureau of Forest Fire Management to reduce the hazard of wildfire.

As wildfire becomes less and less a part of the Pinelands ecosystem, its beneficial effects for wildlife, in retarding vegetative succession, are reduced. Most of the terrestrial habitat management practices utilized on the Pinelands WMA's attempt to compensate for this alteration of the ecosystem.

Proposed aquatic habitat management on the Pinelands WMA's over the next twenty years will effect only a small number of areas. Restoration of dams or water control structures are planned for five former cranberry impoundments: one at Howardsville Bogs and four at April Bogs. Water levels will be manipulated for the benefit of fish and waterfowl in the latter impoundments, two others at Stafford Forge and one each at Colliers Mills, Tuckahoe and Manahawkin. Additional applications of lime and fertilizer may be considered for oak Pond at Winslow and one other pond in the Protection Area. Additionally, the control of aquatic vegetation as well as dredging will be needed at Colliers Mills Lake.

Aquatic habitat management on the Pinelands WMA's over the next two decades will effect only the limited areas outlined above which have already been significantly altered by man.

Potential facilities development on the WMA's of the Pinelands over the next 20 years includes the following:

- 1) new office at Winslow WMA
- 2) new garage at Tuckahoe WMA
- 3) new office, garage, and storage building at Colliers Mills WMA
- 4) shooting range at Winslow and/or Tuckahoe



- 5) boat ramp, access road, and parking lot at Turn Mill Pond on Colliers Mills WMA

These projects are dependent upon the acquisition of funds over and above those which are normally available to the Division of Fish, Game and Wildlife. They represent the maximum in facilities development that will occur over the next two decades if funding sources can be developed.

The activities of the Division of Fish, Game and Wildlife in the Pinelands are not only consistent with the goals and policies of the Pinelands Commission, they represent one of the major avenues through which the Commission's natural resource and recreation goals are realized.

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PART II

AREA MANAGEMENT PLANS

FOR WILDLIFE MANAGEMENT AREAS

IN THE PRESERVATION AND PROTECTION AREAS

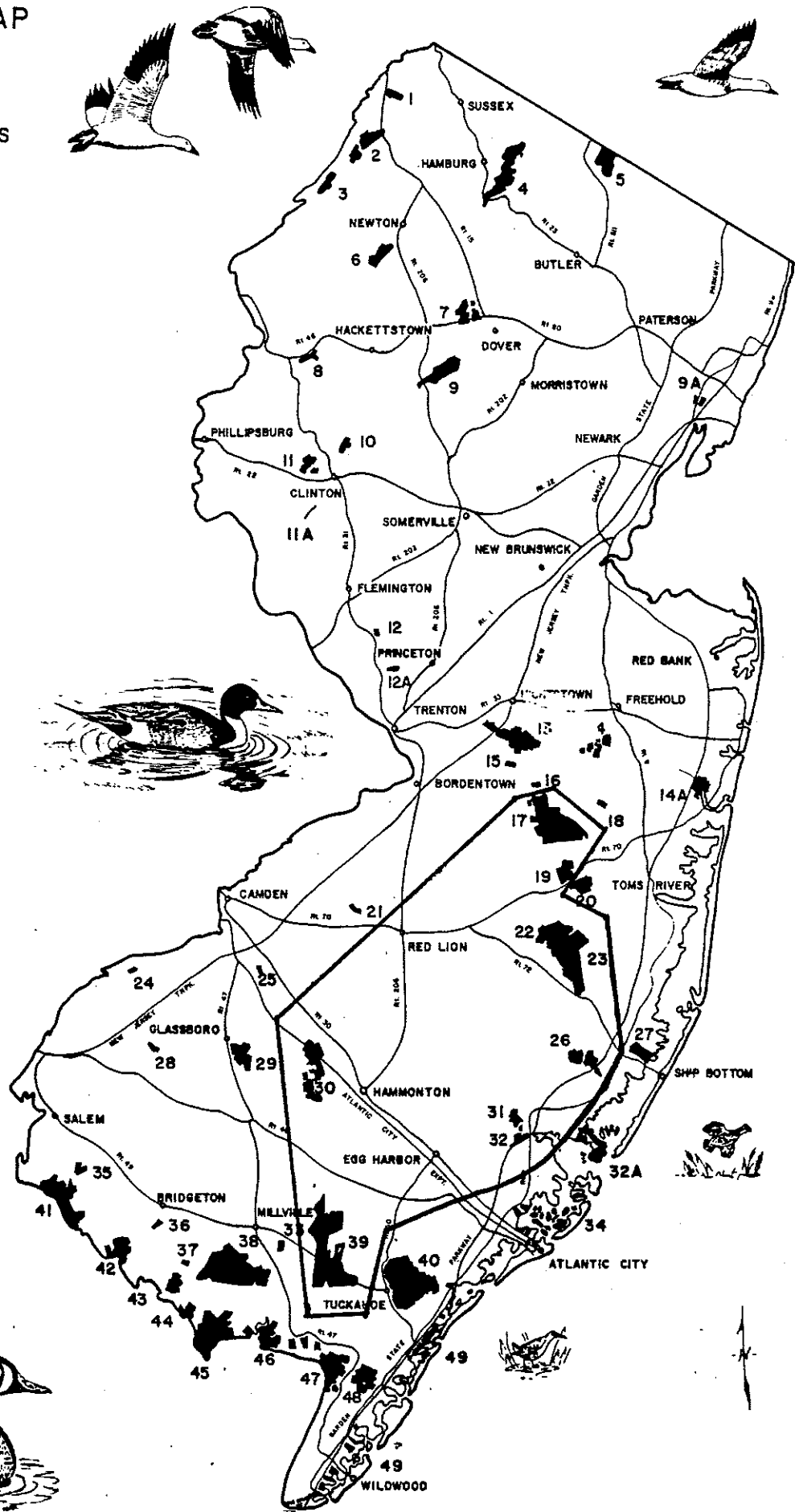
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# LOCATION MAP

## NEW JERSEY WILDLIFE MANAGEMENT AREAS

- 1 Hainesville
- 2 Flatbrook — Roy
- 3 Walpack
- 4 Hamburg Mountain
- 5 Wanaque
- 6 Whittingham
- 7 Berkshire Valley
- 8 Pequest
- 9 Black River
- 9A Saw Mill Creek
- 10 Ken Lockwood Gorge
- 11 Clinton
- 11A Capoolong
- 12 Amwell Lake
- 12A Baldwin Lake
- 13 Assunpink
- 14 Turkey Swamp
- 14A Manasquan
- 15 Imlaystown Lake
- 16 Prospertown Lake
- 17 Colliers Milles
- 18 Butterfly Bogs
- 19 Manchester
- 20 Whiting
- 21 Medford
- 22 Pasadena
- 23 Greenwood Forest
- 24 Logan Pond
- 25 Rowand Pond
- 26 Stafford Forge
- 27 Manahawkin
- 28 Harrisonville Lake
- 29 Glassboro
- 30 Winslow
- 31 Swan Bay
- 32 Port Republic
- 32A Great Bay Blvd.
- 33 Menantico Ponds
- 34 Absecon (Coastal Wetlands)
- 35 Maskells Mill Pond
- 36 Clarks Pond
- 37 Cedarville Ponds
- 38 Edward G. Bevan
- 39 Peaslee
- 40 Lester G. MacNamara
- 41 Mad Horse Creek
- 42 Dix
- 43 Nantuxent
- 44 Fortescue
- 45 Egg Island — Berrytown
- 46 Heislerville
- 47 Dennis Creek
- 48 Beaver Swamp
- 49 Marmora (Coastal Wetlands)



SCALE  
0 5 10 MILES

## Colliers Mills Wildlife Management Area

### A. Introduction

Colliers Mills Wildlife Management Area is located in Jackson and Plumstead Townships in northwestern Ocean County. It covers approximately 12,235 acres and is entirely in the Preservation Area.

Acquisition began in 1941 when approximately 10,000 acres were purchased with monies derived from the sale of hunting and fishing licenses. The remaining acreage was acquired through the 1961 and 1971 Green Acres Bond Issues and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

Woodland covers most of Colliers Mills Wildlife Management Area. The upland forests, present on approximately 6,950 acres, are about an equal mixture of the pine-oak and oak-pine forest types. The 4,600 acres of lowland forest is classified as approximately two-thirds pitch pine lowland with the remainder made up of about equal portions of Atlantic white cedar and hardwood swamp. Approximately 497 acres of fields have been established on this tract.

Most of the tract was burned over by a wildfire in the early 1940's. No major wildfire has effected this area since.

Upland soils on Colliers Mills Wildlife Management Area are predominately of the sandy, gently sloping Lakewood series. Lowland soils are primarily of the St. John's and Downer groups. The Berryland, Evesboro, Atsion and Sassafras soil series are also present.

This tract is drained by numerous tributaries of the Ridgeway Branch of the Toms River. Six major impoundments, covering approximately 180 acres, are located on the tract.

Wildlife associations are those typical of the Pinelands-Inner Coastal Plain transition area. Habitat management has resulted in above average populations of deer, quail, grouse, rabbits and early successional non-game birds. The eastern bluebird, an uncommon Pinelands resident, is quite common here due, in large extent, to a nest-box program. Waterfowl diversity and abundance is outstanding due to manipulation of the water level in many of the impoundments for their benefit. Bird diversity, in general is usually high for a Pinelands area. Threatened and endangered species observed on the tract include the Pine Barrens tree frog and the pine snake (Figure 1B).

### C. Past Development

#### 1. Wildlife Habitat Management

Between 1951 and the present, approximately 497 acres were cleared to establish fields on Colliers Mills Wildlife

Management Area. Borders of Lespedeza bicolor, autumn olive and multiflora rose were planted around many of the newly cleared fields. Many of these border plantings never became established or have since died out. These fields have been maintained using the techniques previously outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, has been conducted on only about 100 acres of this tract since its acquisition.

Shortly after acquisition of the tract, Colliers Mills and Turn Mill Ponds were restored. This pond was later stocked with bass resulting in a viable population which exists today. Between 1943 and 1945 several other small impoundments were restored. Lake Success was restored between 1949 and 1951. In 1968, the impoundment known as Kennedy Bog was created. The dam impounding Turn Mill Pond washed out in 1981. It was restored in 1984 and a modern water control structure installed. Nearby fill was used to rebuild the dam and a snake hibernaculum was created to mitigate the loss of potential pine snake habitat caused by the fill removal.

## 2. Access

When this tract was acquired in the early 1940's there were no gravel roads on the area. The sand roads were usually impassable except by four-wheel drive vehicles. During the 1950's and 1960's, a total of six miles of roads were constructed using gravel deposits found on the tract. Many additional miles of sand roads were widened to facilitate maintenance with heavy equipment.

In 1969, several side roads were blocked off to prevent vehicular damage to planted fields. These are indicated on Figure 1 by perpendicular slashes across the effected roads.

## 3. Facilities

Two garages that were present on the tract at acquisition (Figure 1, CM-9) have been maintained and used to store heavy equipment.

A trailer was moved to the tract around 1977 to function as an administrative office (Figure 1, CM-12).

In the mid 1970's, a shooting range was developed on the tract (Figure 1, CM-8) to function as a hunter education facility and a training area for the conservation officers. A small, one-room clubhouse was built adjacent to the range to function as a classroom.



D. Current and Proposed Development

1. Wildlife Habitat Management

The 497 acres of fields on Colliers Mills Wildlife Management Area are maintained on an annual basis utilizing the techniques outlined on page 7. Current plans call for the clearing of about 5 acres of new fields per year on this tract with a cumulative maximum of about 50 acres of additional fields.

Forest management, as outlined in Part I, page 4, will be conducted on an average of about 15 acres of this tract per year.

Current plans call for water level management for fish and/or waterfowl as outlined in Part I, pages 10 & 11 to be implemented at Turn Mill Pond and Success Lake (Figure 1, CM-5 & 11).

Dredging, as outlined in Part I, page 14 is scheduled for Colliers Mills Lake (Figure 1, CM-4) to restore water depth and remove excess aquatic vegetation. This project will be implemented when funding becomes available.

2. Access

The construction of a boat ramp, spur road, parking lot and lavatory facility is planned adjacent to Turn Mill Pond (Figure 1, CM-7) if and when funding for this project becomes available.

3. Facilities

Current plans for facility development on this tract call for the construction of a building to expand the amount of administrative office space available (Figure 1, CM-12), an additional equipment storage building (Figure 1, CM-9) and an expansion of the existing shooting range to about double its present size (Figure 1, CM-8). These projects will be implemented as funding becomes available and have not, as yet, reached the design phase.

E. Forest Fire Management

Controlled burning to reduce wildfire hazards began on Colliers Mills Wildlife Management Area in the mid-1960's. Currently about 400 acres of this tract per year are subjected to controlled burning based on the recommendations of the Bureau of Development and Maintenance and the local fire warden.

KEY TO MAP SYMBOLS



Proposed Wildlife Habitat Development



Current Facilities and/or Proposed Facilities  
Development



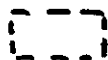
Proposed Access Development



Maintained Field



Maintained Road



Parking Lot

KEY TO FIGURE 1

- CM 4 - proposed dredging
- CM 5 - proposed water level management
- CM 7 - proposed boat ramp, access road, parking lot
- CM 8 - shooting range with proposed expansion
- CM 9 - maintenance buildings with proposed expansion
- CM 10- gravel pit
- CM 11- proposed water level manipulation for waterfowl
- CM 12- administrative office with proposed expansion

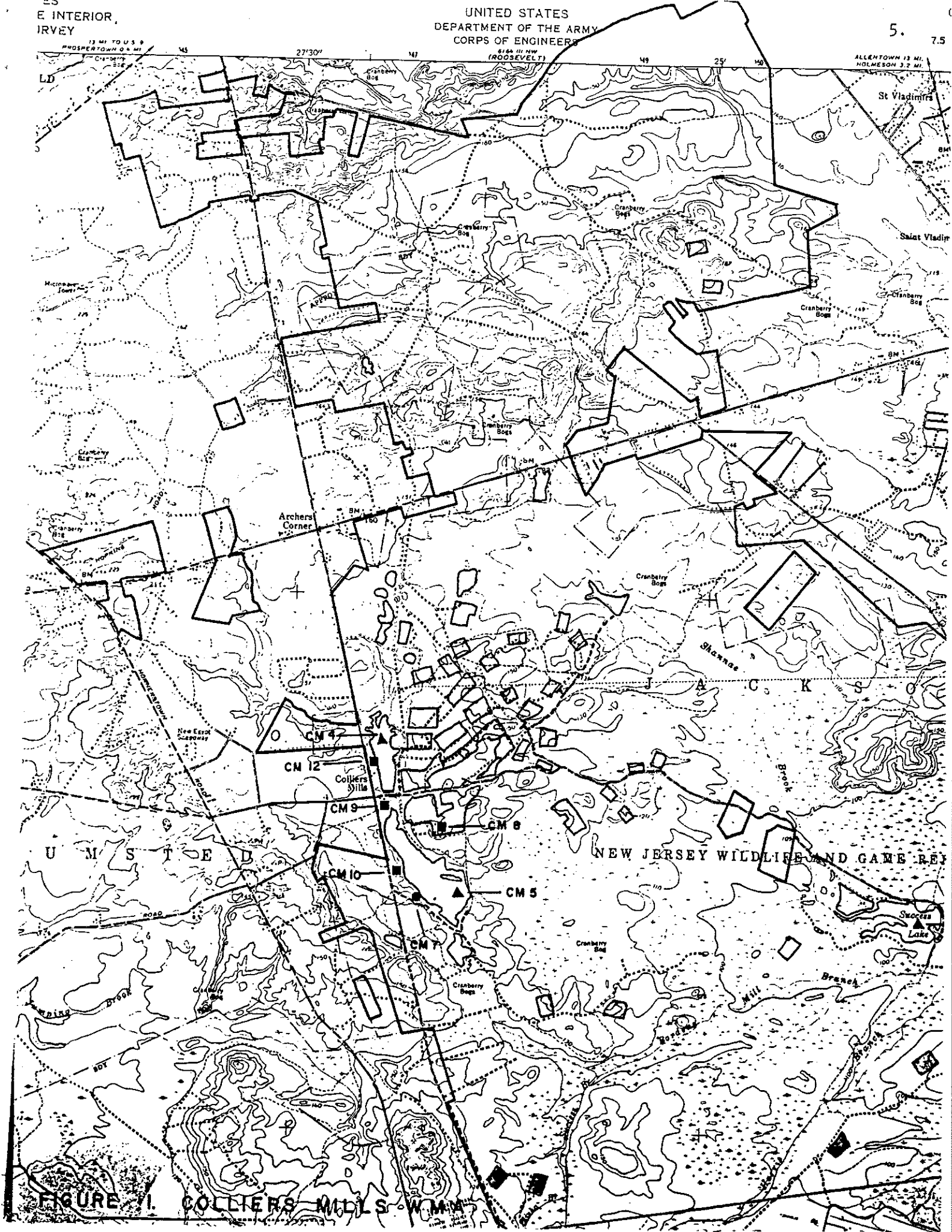


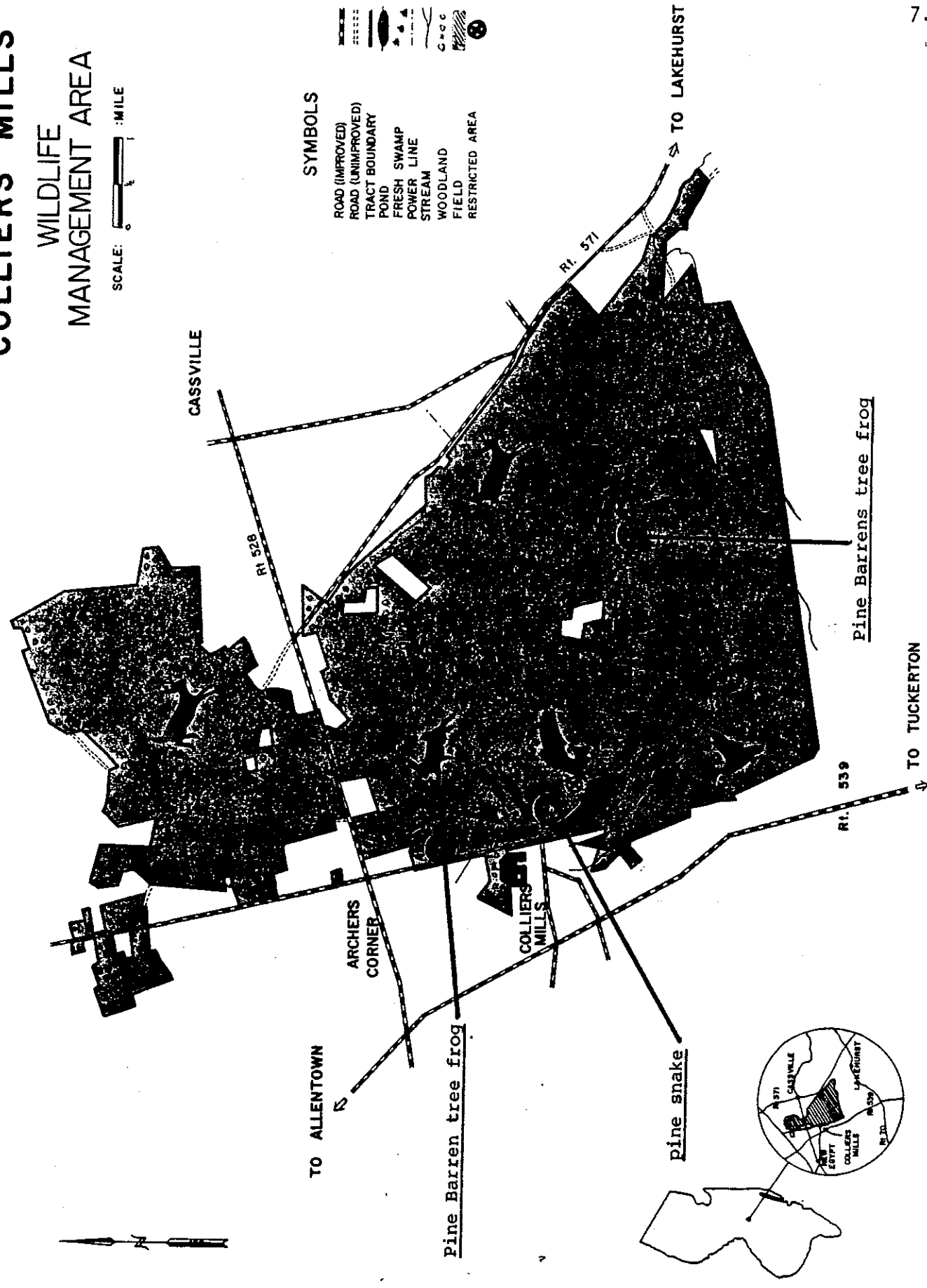
FIGURE 1. COLLIERS MILLS - W.M.M.

FIGURE 1B: Endangered and threatened species locations on Colliers Mills WMA

# COLLIERS MILLS WILDLIFE MANAGEMENT AREA

SCALE: 1/4" = 1 MILE

- SYMBOLS**
- ROAD (IMPROVED)
  - ROAD (UNIMPROVED)
  - TRACT BOUNDARY
  - POND
  - FRESH SWAMP
  - POWER LINE
  - STREAM
  - WOODLAND
  - FIELD
  - RESTRICTED AREA



## Manchester Wildlife Management Area

### A. Introduction

Manchester Wildlife Management Area is located in Manchester Township in northwestern Ocean County. It covers approximately 2,376 acres and is entirely within the Preservation Area.

Most of this tract, 2,300 acres, was purchased in 1954 with monies derived from the sale of hunting and fishing licenses. The remaining 76 acres was purchased through the 1961 Green Acres Bond Issue and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

With the exception of 20 acres of fields, Manchester Wildlife Management Area is completely covered by woodland. Three-fourths of the tract is covered by upland forests which can be split almost equally amongst the pine-oak and oak-pine forest types. The remainder of the tract is comprised of lowland forests most of which are classified as hardwood swamp and pitch pine lowland. A small portion of the lowland forests are Atlantic white cedar swamps.

Upland soils on the tract are primarily of the sandy, gently sloping Lakewood series while the St. John's soil group dominates the lowlands.

Three small streams drain the area. They are Old Hurricane Brook, South Ruckels Branch and Middle Ruckels Branch. There are no ponds on this tract.

Wildlife associations on the tract are those typical of the central Pinelands. Threatened or endangered species observed on the tract include the Pine Barrens tree frog, the timber rattlesnake and the pine snake (Figure 2A).

### C. Past Development

#### 1. Wildlife Habitat Management

The only wildlife habitat management that has occurred on this tract has been the clearing and subsequent maintenance of four fields with a combined area of about 20 acres.

Forest management, as outlined in Part I, page 4, has been conducted on only about 25 acres of this tract since its acquisition.

#### 2. Access

No access development has occurred on this tract.

#### 3. Facilities

No facilities development has occurred on this tract.

D. Current and Proposed Development

1. Wildlife Habitat Management

The 20 acres of fields on Manchester Wildlife Management Area are maintained on an annual basis utilizing the techniques outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, will be conducted on an average of about 10 acres of this tract per year.

2. Access

No additional access type development is planned for this tract.

3. Facilities

No facilities development is planned for this tract.

E. Forest Fire Management

Controlled burning to reduce wildfire hazards began on Manchester Wildlife Management Area in the mid 1960's. Currently about 100 acres of this tract per year are subjected to controlled burning based on the recommendations of the Bureau of Development and Maintenance and the local fire warden.

KEY TO MAP SYMBOLS



Proposed Wildlife Habitat Development



Current Facilities and/or Proposed Facilities  
Development



Proposed Access Development



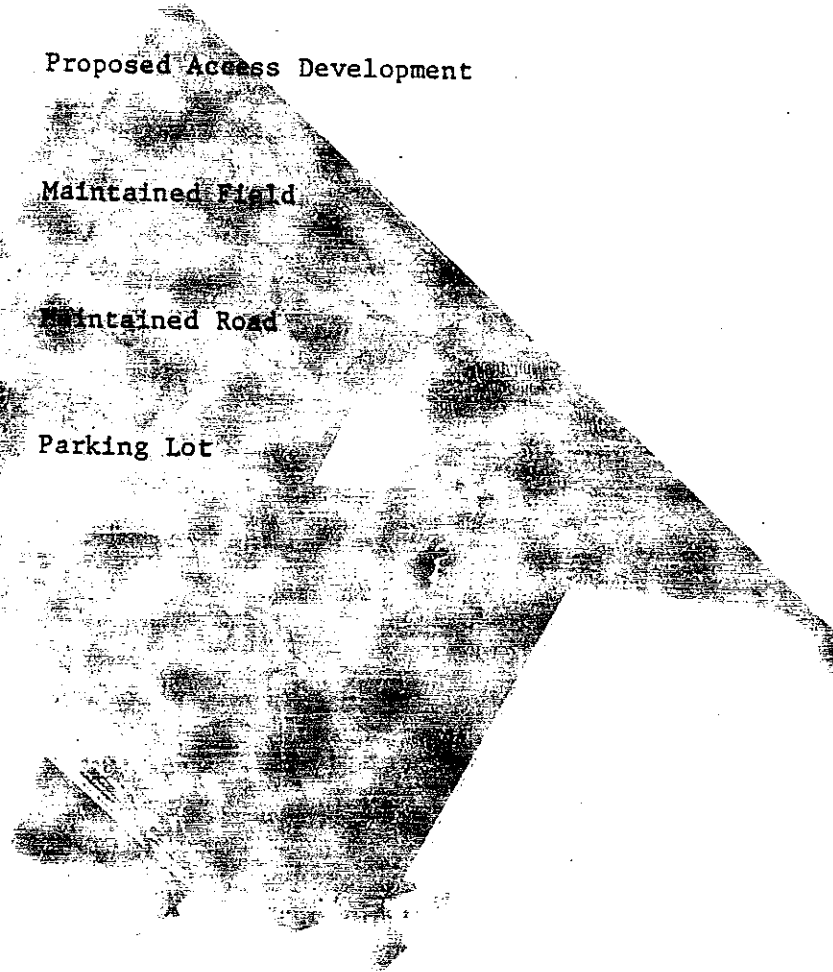
Maintained Field

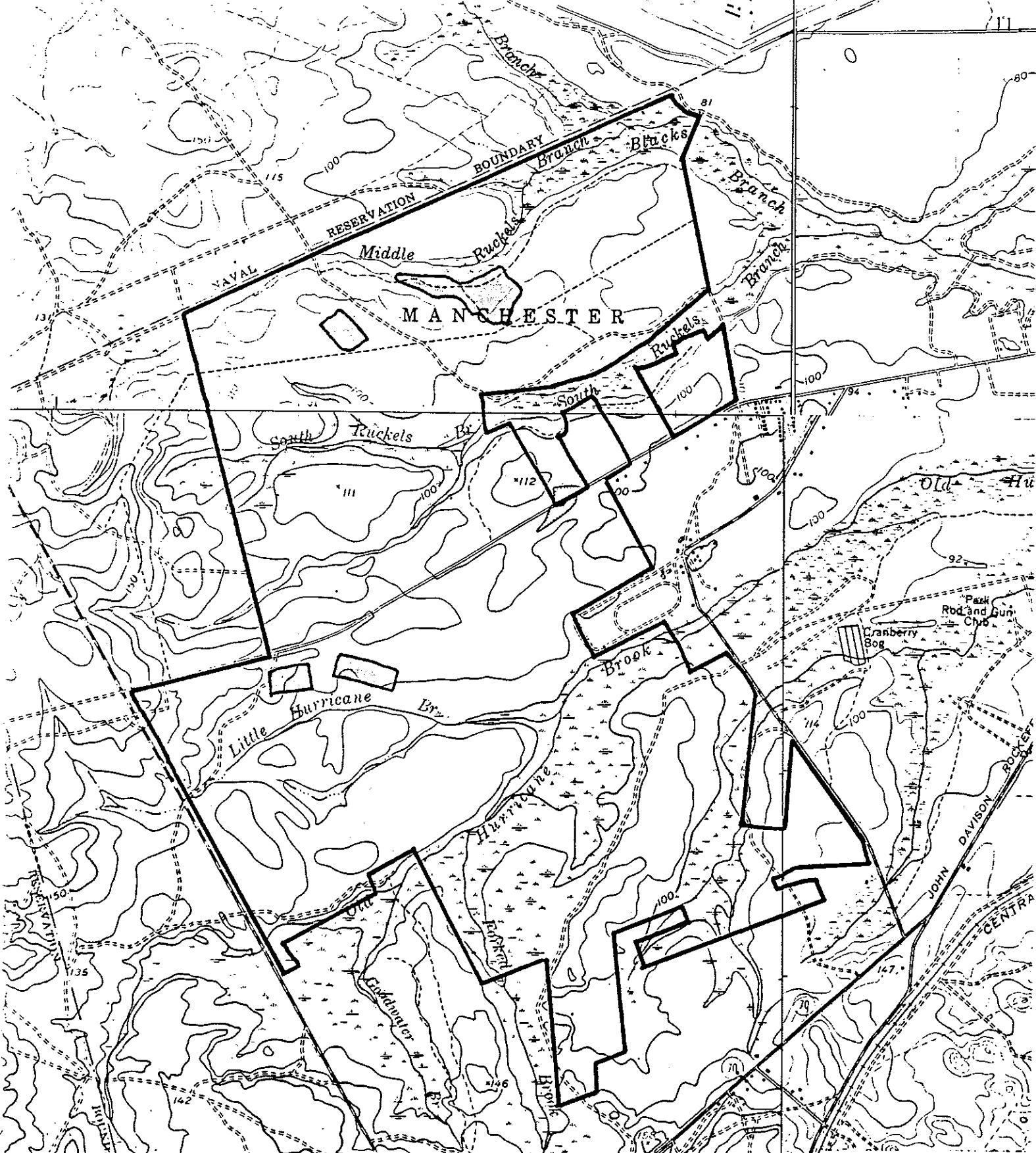


Maintained Road



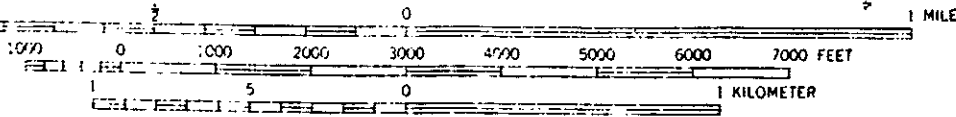
Parking Lot



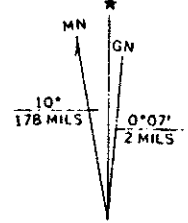


**FIGURE 2. MANCHESTER WMA**

SCALE 1:24 000



CONTOUR INTERVAL 10 FEET  
DATUM IS MEAN SEA LEVEL

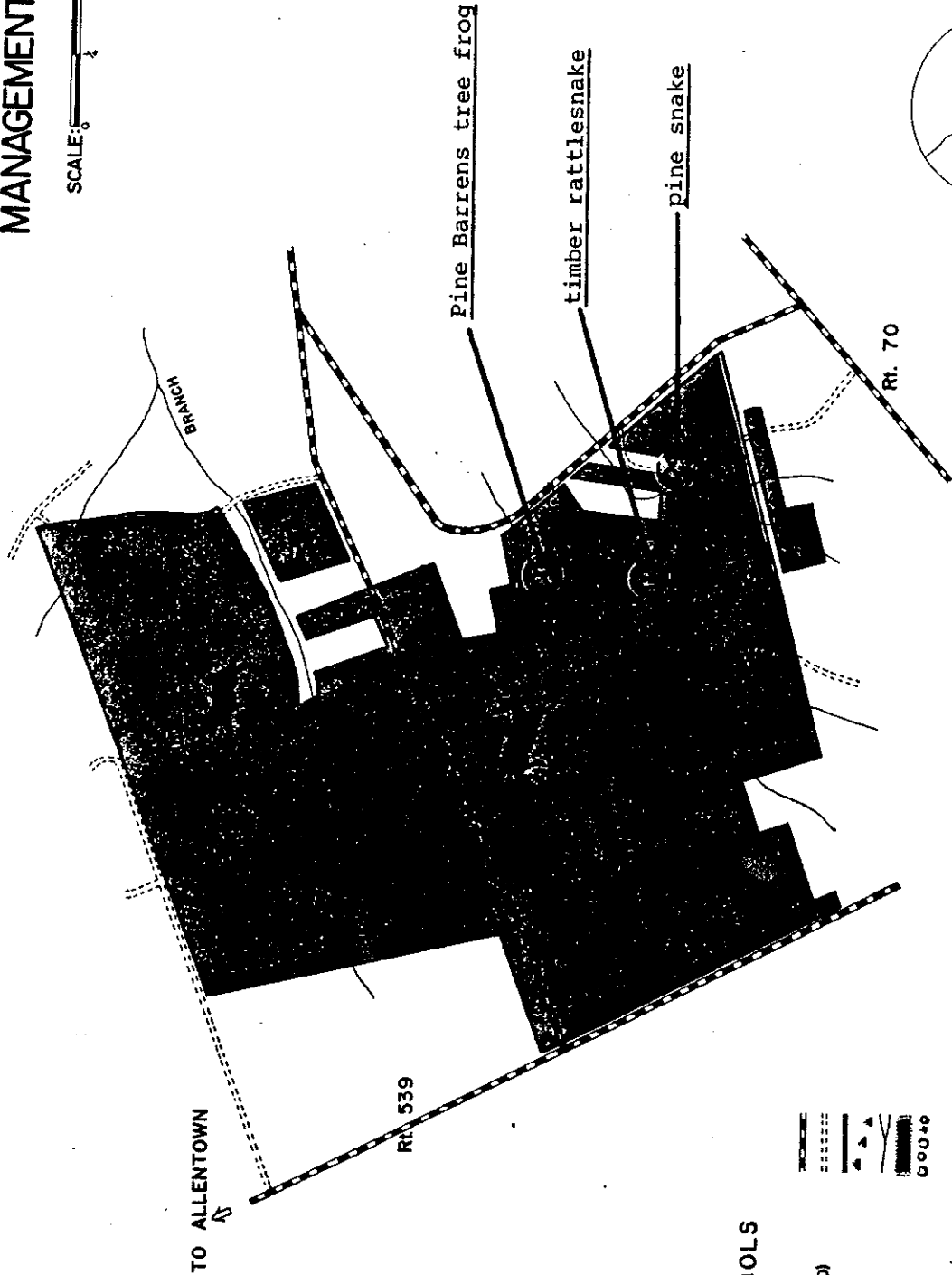
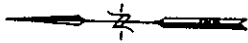


UTM GRID AND 1966 MAGNETIC NORTH



# MANCHESTER WILDLIFE MANAGEMENT AREA

SCALE: 1/4 MILE



### SYMBOLS

- ROAD (IMPROVED)
- ROAD (UNIMPROVED)
- TRACT BOUNDARY
- FRESH MARSH
- STREAM
- FIELD
- WOODLAND

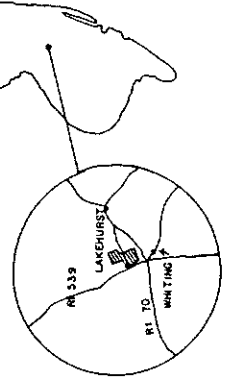


FIGURE 2A: Endangered species locations on Manchester WMA

## Greenwood Forest-Pasedena Wildlife Management Area

### A. Introduction

Greenwood Forest-Pasedena Wildlife Management Area is located in Lacey, Barnegat and Manchester Townships in west-central Ocean County. It covers approximately 16,333 acres and is entirely in the Preservation Area.

The majority of the tract, 9,963 acres, was purchased in 1947 with monies derived from the sale of hunting and fishing licenses. Approximately 2,217 acres were purchased through the 1961 Green Acres Bond Issue. In 1984, 4,153 acres were added to this tract as part of the Pinelands Acquisition program utilizing 75% federal 502 funds matched by 25% Green Acres funds earmarked for acquisition in this region.

### B. Natural Characteristics

The great majority of Greenwood Forest-Pasedena Wildlife Management Area, about 15,500 acres, is covered by upland forests. A wildfire in 1963 severely burned about 90% of this area. As a result, most of the forests on the tract exhibit early successional stages. Approximately three-fourths of the upland forest is classified as pine-oak, with the remainder being classified as oak-pine.

Only a few hundred acres of this tract are covered by lowland forests. These are primarily of the Atlantic white cedar and pitch pine lowland types with a few small areas of hardwood swamp being present. Four hundred and ninety acres of fields have been established on the tract.

The soils of Greenwood Forest-Pasedena Wildlife Management Area are primarily level to gently sloping sands of the Lakewood and Sassafras soil series.

Three small streams drain this area. They are Webbs Mill Branch, Chamberlain Branch and the headwaters of the Wading River. Three lakes, comprising a total surface area of 30 acres, are present on the tract.

Wildlife associations on the tract are those typical of the central Pinelands. Habitat management, along with the 1963 wildfire, have resulted in outstanding populations of early successional species such as deer, quail, grouse, rabbits and a host of non-game birds. Red and grey foxes are also present in unusually large numbers. Turkeys, first released on the area in 1981, are presently quite common and increasing. Numerous threatened and endangered species have been observed on the tract including the Pine Barrens tree frog, timber rattlesnake, pine snake and corn snake (Figures 3A & B).

### C. Past Development

#### 1. Wildlife Habitat Management

Between 1956 and the present, approximately 490 acres were cleared to establish fields, 250 acres of which are in the Quail Management Area (Figure 3, GW-3). These fields have been maintained using the techniques previously outlined in Part I, page 7.

2. Access

The roads present on the tract at acquisition have been maintained by grading and adding gravel where it is needed. No other access type development has occurred.

3. Facilities

No facilities development has occurred on this tract.

4. Other Development

In 1956, 29 miles of survey lines were cleared to a width of 12 feet to establish the tract's boundary lines. AT&T cleared a 75 foot right-of-way through the tract in 1956 and installed an underground cable. This right-of-way is maintained by AT&T.

Following the 1963 wildfire, most of the dead or severely damaged pine on the area was harvested for pulpwood in a timber salvage operation.

D. Current and Proposed Development

1. Wildlife Habitat Management

The 490 acres of fields on Greenwood Forest-Pasedena Wildlife Management Area are maintained on an annual basis utilizing the techniques outlined on page 7.

Current plans call for the clearing of about 10 acres of new fields per year in the Quail Management Area which has been designed for optimum production of bobwhite quail. The goal is to eventually clear about half of this 1,000 acre area. So far, about 250 acres of this area have been cleared.

Forest management, as outlined on page 4, will be conducted on an average of about 10 acres of this tract per year.

The restoration of one of a series of former impoundments is planned for the Howardsville area (Figure 3, GW-1) if and when funding for the project becomes available. Water level management for fish and/or waterfowl, as outlined on pages 10 & 11, may be implemented on the water body created by this project.

2. Access

Currently maintained roads are outlined on Figure 3. Gravel for road maintenance is extracted from 4 small pits located on

the tract (Figure 3, GW-2). No other access development is contemplated at this time.

3. Facilities

No facilities development is contemplated for this tract at the present time.

E. Forest Fire Management

Controlled burning to reduce wildfire hazards began on Greenwood Forest-Pasedena Wildlife Management Area in the mid 1960's. Currently about 1,000 acres of this tract per year are subjected to controlled burning based on the recommendations of the Bureau of Development and Maintenance and the local fire warden.

KEY TO MAP SYMBOLS



Proposed Wildlife Habitat Development



Current Facilities and/or Proposed Facilities Development



Proposed Access Development



Maintained Field



Maintained Road



Parking Lot

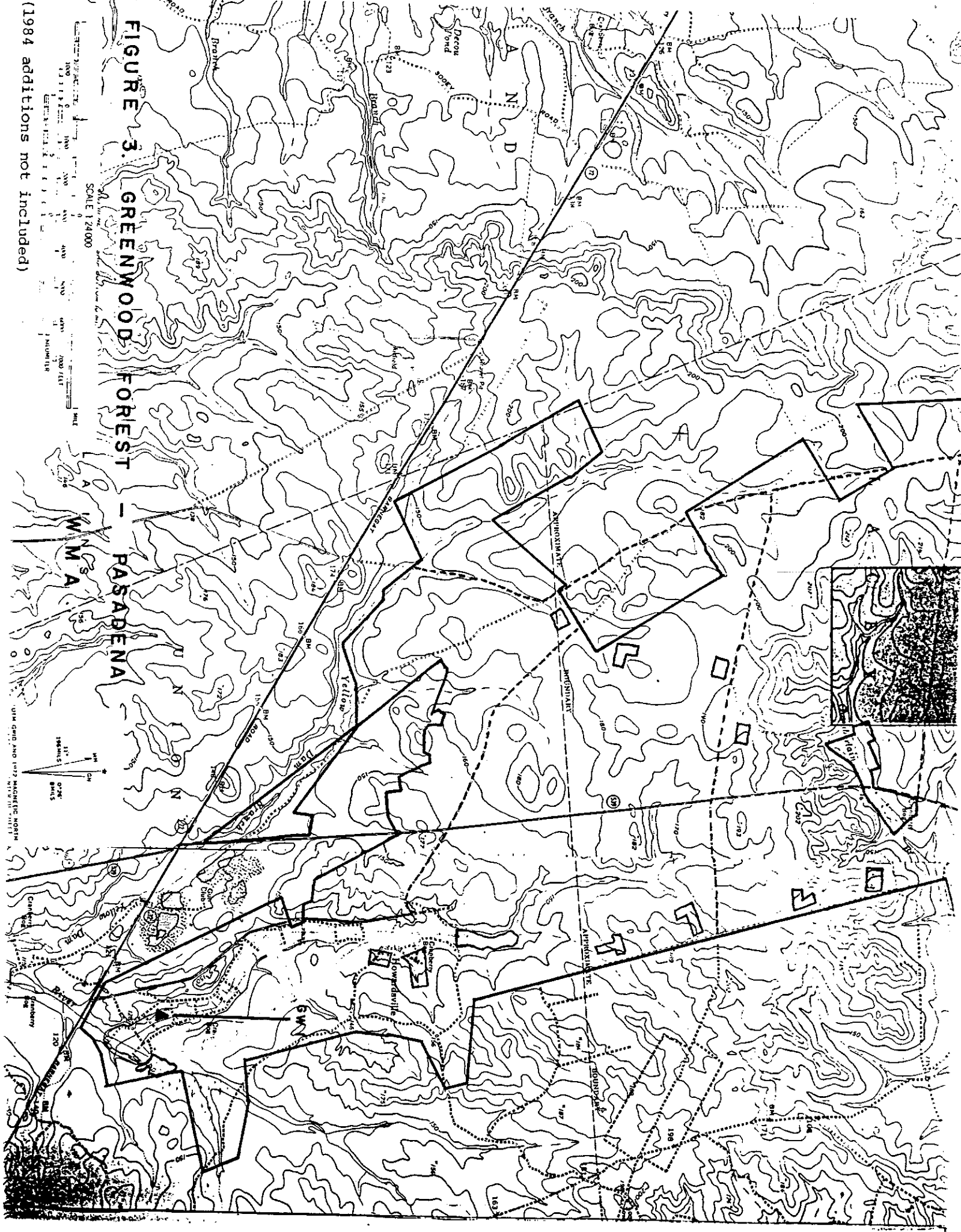
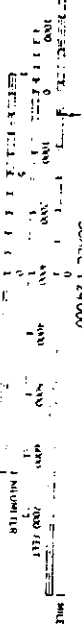
KEY TO FIGURE 3

- GW 1 - proposed dam restoration
- GW 2 - gravel pits
- GW 3 - Quail Management Area

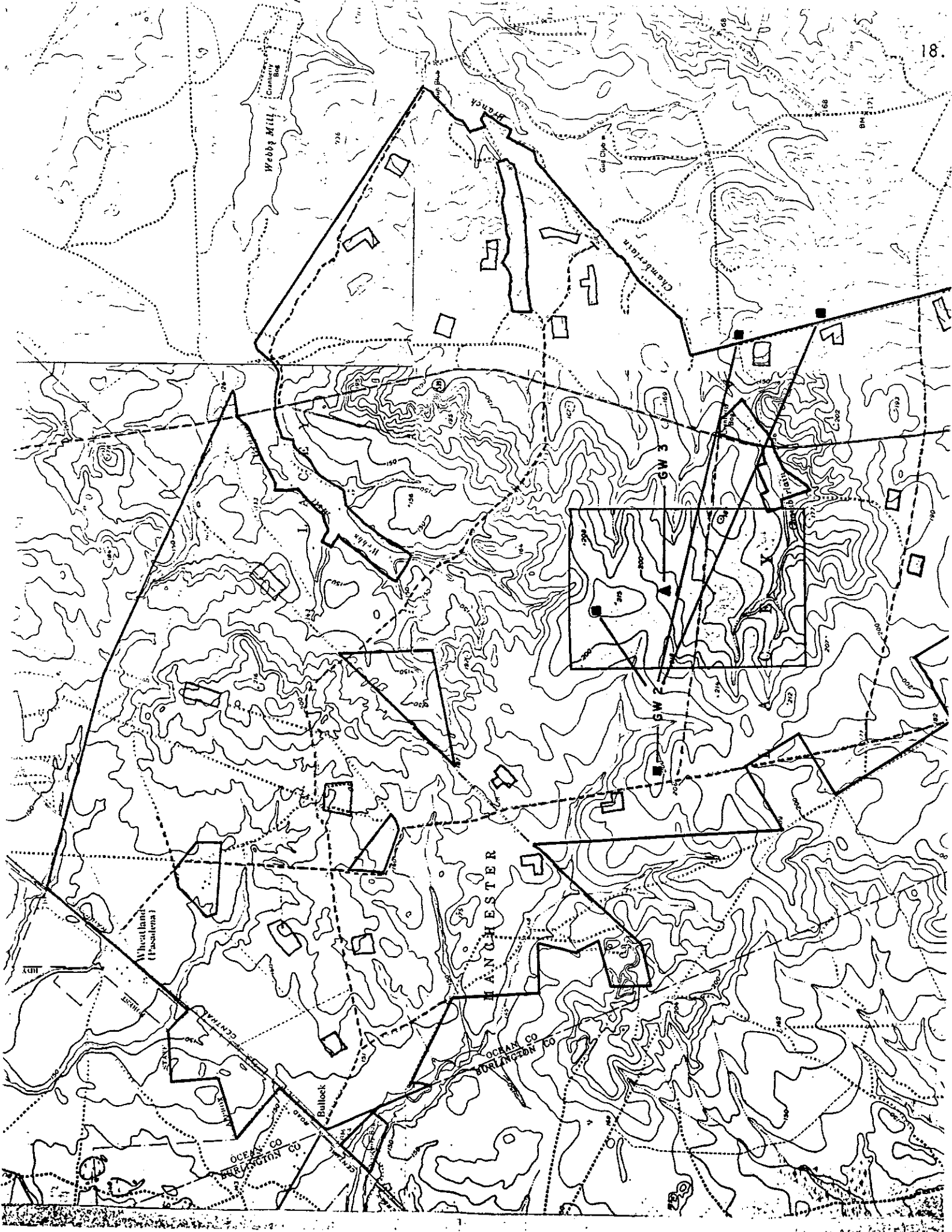
(1984 additions not included)

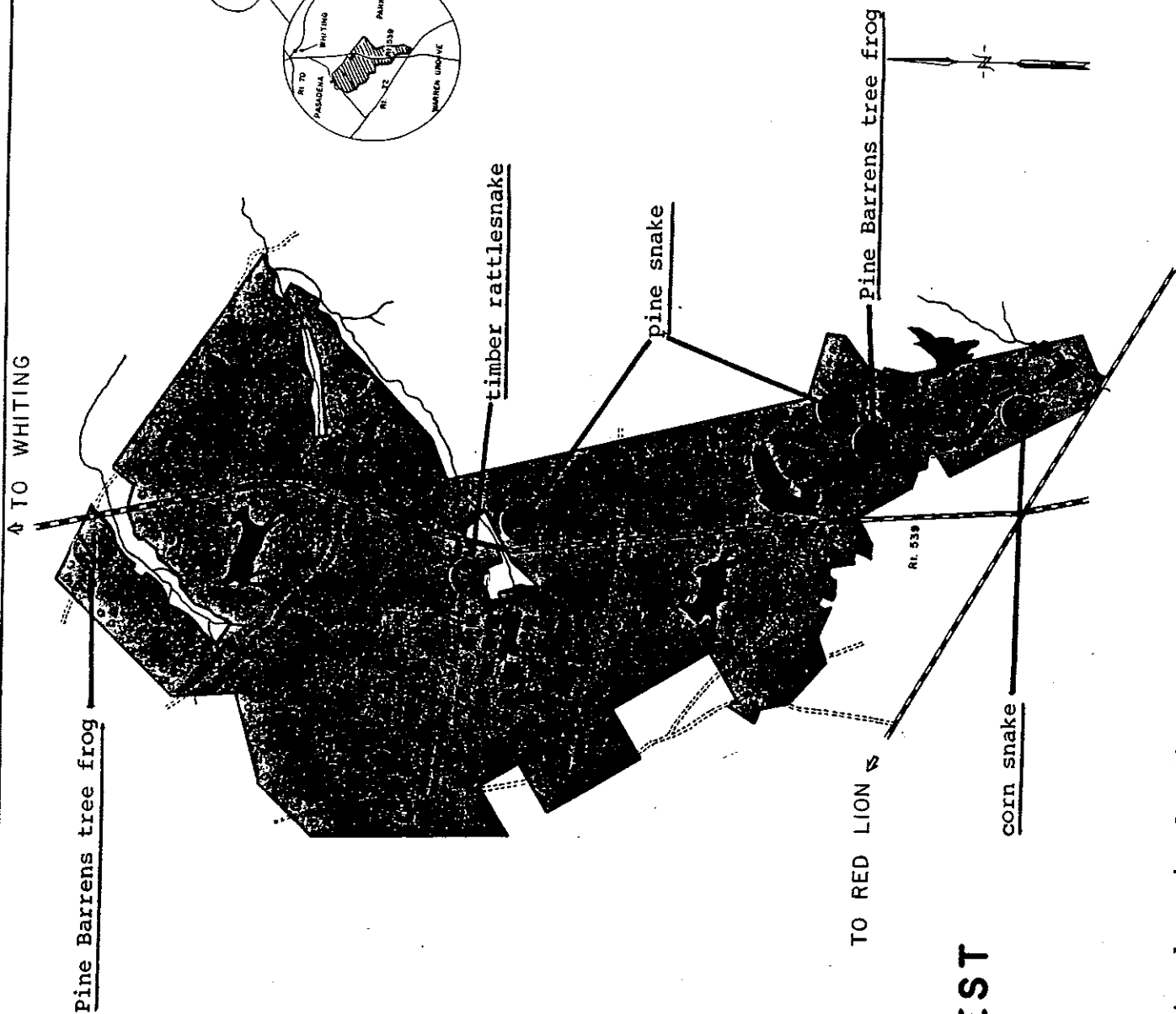
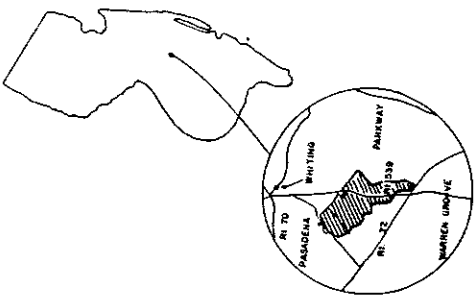
# FIGURE 3. GREENWOOD FOREST - PASADENA

SCALE 1:24,000



11° 17' 00" N  
117° 02' 00" W  
MAGNETIC NORTH





**SYMBOLS**

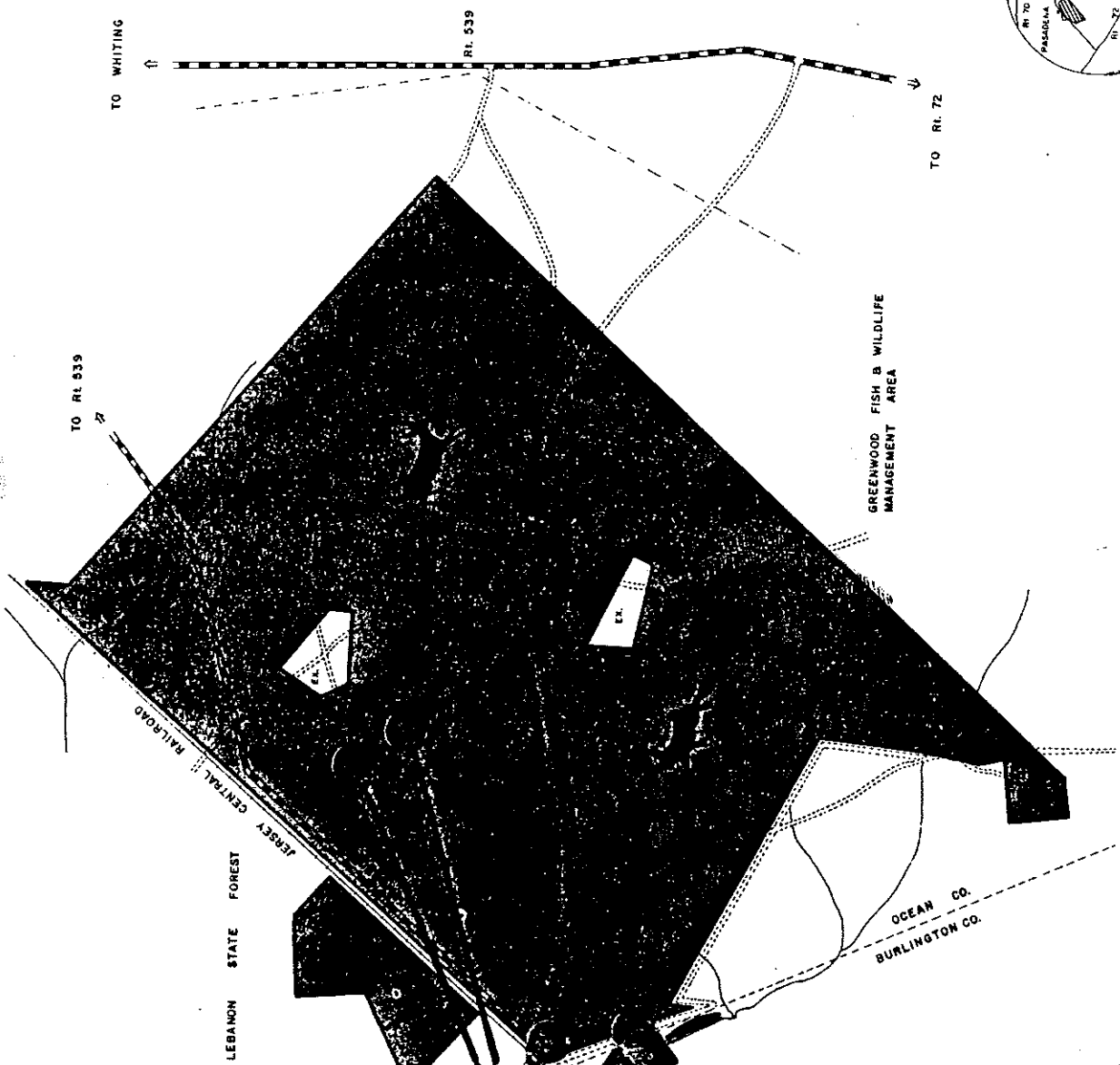
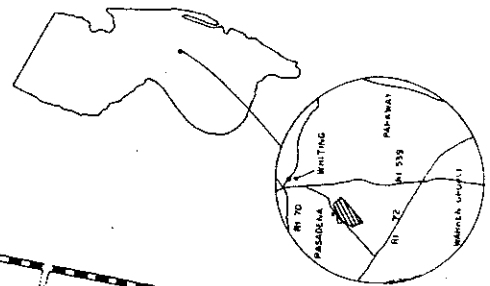
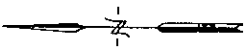
- ROAD (IMPROVED)
- ROAD (UNIMPROVED)
- TRACT BOUNDARY
- STREAM
- POND
- FIELD
- FRESH SWAMP
- WOODLAND

**GREENWOOD FOREST  
WILDLIFE  
MANAGEMENT AREA**

SCALE: MILE

FIGURE 3A: Endangered and threatened species locations on Greenwood-Pasadena WMA





**SYMBOLS**

- ROAD (IMPROVED)
- ROAD (UNIMPROVED)
- TRACT BOUNDARY
- LAKE OR POND
- POWER LINE
- COUNTY LINE
- STREAM
- FIELD-WOODLAND EDGE
- RAILROAD
- WOODLAND

Pine Barrens tree frog

GREENWOOD FISH & WILDLIFE  
MANAGEMENT AREA

OCEAN CO.  
BURLINGTON CO.

**PASADENA  
WILDLIFE  
MANAGEMENT AREA**

SCALE: 1/4 MILE

FIGURE 3B: Endangered and threatened species locations on Pasadena WMA

## Stafford Forge Wildlife Management Area

### A. Introduction

Stafford Forge Wildlife Management Area is located in Eagleswood and Little Egg Harbor Townships in southern Ocean County. It covers approximately 2,788 acres. With the exception of a parcel of about 100 acres which lies east of the Garden State Parkway in the Pinelands National Reserve, this entire tract lies within the Preservation Area.

This tract, acquired in 1965, was purchased with funds derived from the 1961 Green Acres Bond Issue and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

The majority of Stafford Forge Wildlife Management Area, about 1,760 acres, is covered by upland forest which are primarily of the pine-oak habitat type. Lowland forest occupy approximately 760 acres and are mostly classified as pitch pine lowlands. Small areas of Atlantic white cedar and hardwood swamps are present. There are approximately 50 acres of maintained fields on the tract.

A wildfire, in 1971, destroyed or severely damaged most of vegetation on the tract. As a result, most of the tract's forests exhibit a very early successional age.

Soils on this area are predominantly of the gently rolling, droughty Lakewood Sand and Atsion Loamy Sand types. The Pocomoke soil series dominates the lowlands.

Westecunk Creek and three tributaries, Governor's Branch, Log Swamp Branch and Rail Branch flow through the area. Four major impoundments, two off stream, of approximately 200 acres, are located on the tract.

Wildlife associations on the tract are those typical of the central Pinelands. Early successional species, particularly deer, quail and grouse, are especially abundant on this area as a result of the 1971 wildfire and habitat management activities. Waterfowl are present in large numbers due to the proximity of the coastal marshes. Numerous threatened and endangered species have been observed on the tract including the bald eagle, Pine Barrens tree frog and pine snake (Figure 4A). Excellent populations of pickerel and catfish exist in the reservoir pond.

### C. Past Development

#### 1. Wildlife Habitat Management

At the time of acquisition, only one field existed on the tract. Two shrub hedgerows were installed to break it up into smaller blocks to increase the "edge effect". Shrubs and evergreens were also planted along some of its borders.

Since acquisition, 12 additional fields have been cleared making a total 50 acres in field on the tract. These fields have been maintained using the techniques outlined in Part I, page 7.

Water level management for waterfowl, as outlined in Part I, page 10, has been conducted on an annual basis in the lower reservoir pond.

Lime and fertilizer, for fisheries management purposes, have been applied to the offstream impoundments on this tract.

2. Access

Many of the roads present on the tract at acquisition have been maintained by grading and adding gravel where it is needed. No other access type development has occurred.

3. Facilities

No facilities development has occurred on this tract.

D. Current and Proposed Development

1. Wildlife Habitat Management

The 50 acres of fields on Stafford Forge Wildlife Management Area are maintained on an annual basis utilizing the techniques outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, will be conducted on an average of about 5 acres of this tract per year.

Water level management for waterfowl, as outlined in Part I, page 10, will be conducted on the lower reservoir pond on an annual basis.

2. Access

Currently maintained roads are outlined on Figure 4. Gravel for road maintenance is extracted from a 3 acre pit located on the tract (Figure 4, SF-1). No other access development is contemplated at this time.

3. Facilities

No facilities development is currently planned for this tract.

KEY TO MAP SYMBOLS



Proposed Wildlife Habitat Development



Current Facilities and/or Proposed Facilities  
Development



Proposed Access Development



Maintained Field



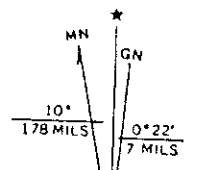
Maintained Road



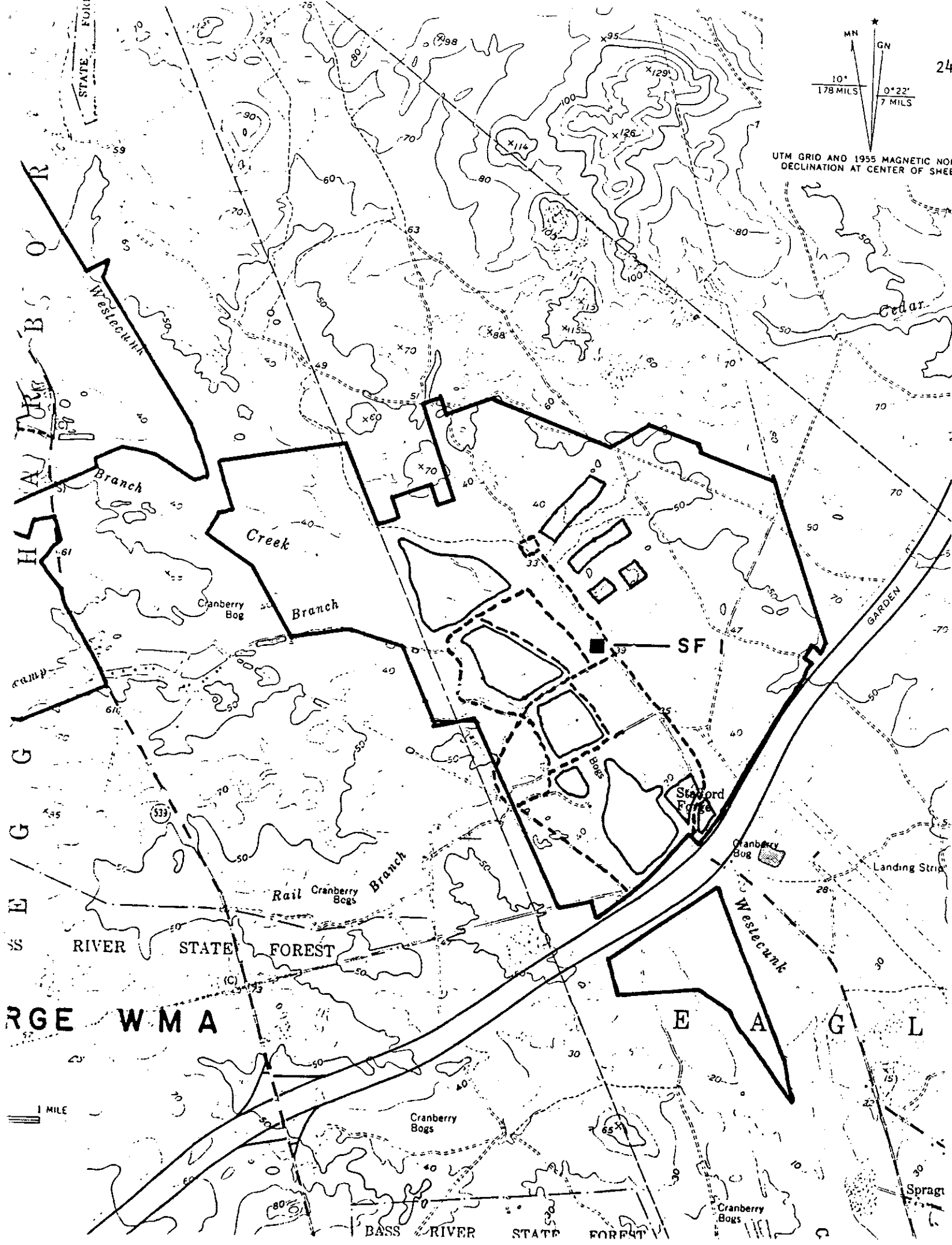
Parking Lot

KEY TO FIGURE 4

SF 1 - gravel pit



UTM GRID AND 1955 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



H  
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L

BASS RIVER STATE FOREST

Cranberry Bogs

Spragt

Wesicunk

Cranberry Bog

Stanford Forge

Bogs

SF I

GARDEN

Cedar

Branch

Creek

Branch

Branch

Branch

Branch

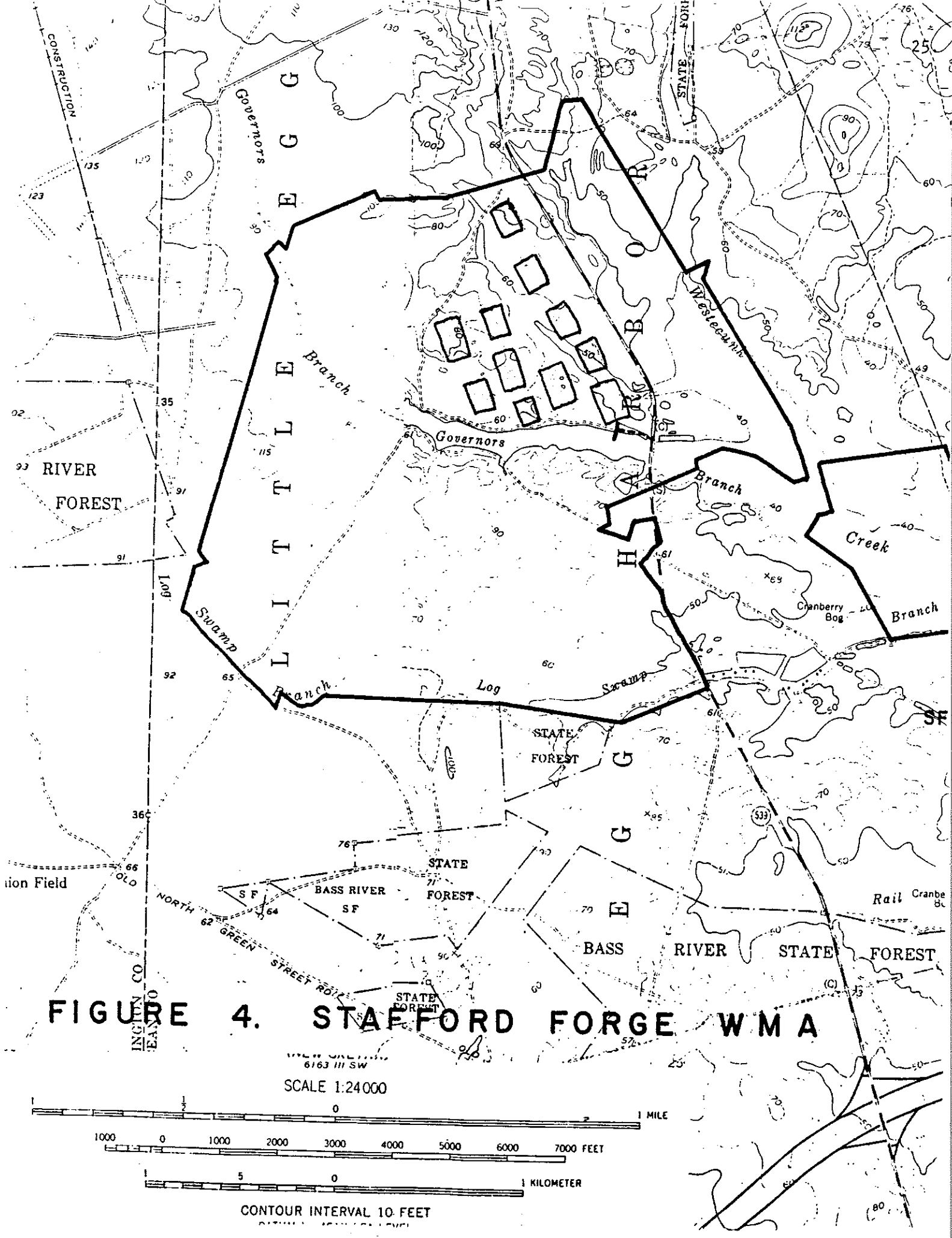
Branch

Branch

Branch

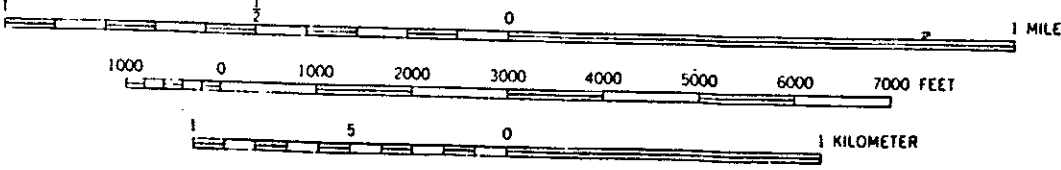
Branch

Branch



**FIGURE 4. STAFFORD FORGE WMA**

6163 III SW  
SCALE 1:24000



CONTOUR INTERVAL 10 FEET

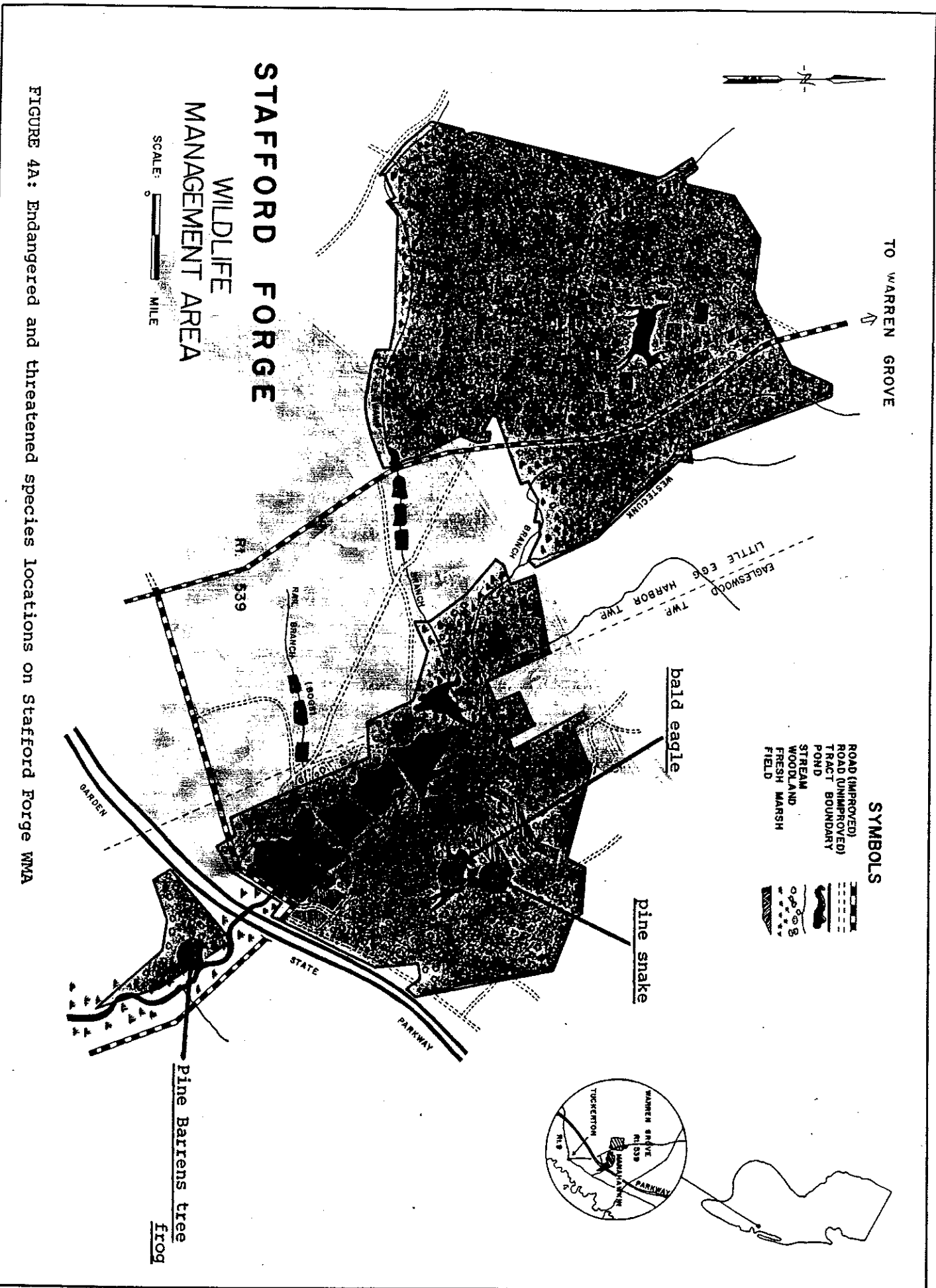


FIGURE 4A: Endangered and threatened species locations on Stafford Forge WMA

## Swan Bay Wildlife Management Area

### A. Introduction

Swan Bay Wildlife Management Area is located in Washington Township in southeastern Burlington County. It covers approximately 1,078 acres and is entirely within the Preservation Area.

This tract was purchased through the 1961 Green Acres Bond Issue and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

Most of Swan Bay Wildlife Management Area, 814 acres, is salt marsh. A small portion of the tract, 264 acres, is lowland forest dominated primarily by the pitch pine lowland habitat type. Small areas of Atlantic white cedar and hardwood swamp are present within the lowland forest portion of the tract.

Tidal marsh soils, organic silts subject to daily flooding, dominate this tract. The lowland forest section is comprised of nearly level, poorly to very poorly drained soils of the Atsion-Muck-Alluvial land soil association.

Numerous tidal creeks run through this tract, the biggest of which is Turtle Creek. The Mullica River forms the southern boundary of the area while the Wading River skirts its eastern edge. No fresh water ponds are present on the tract.

Wildlife associations on the tract are those typical of the Atlantic Coast salt marsh, its edges and associated waters. With salt marsh being one of the world's most productive habitat types, this tract literally teems with wildlife. The wood turtle is the only threatened or endangered species to have been observed on the area (Figure 5A).

### C. Past Development

#### 1. Wildlife Habitat Management

In cooperation with the Burlington County Mosquito Control Commission, open marsh water management is outlined in Part I, page 15, was conducted on all the appropriate salt marsh areas of the tract.

#### 2. Access

The only development that has occurred on this tract has been the improvement of Turtle Creek Rd. and the construction of a small parking lot to provide access to the tidal creeks of the area as well as the Mullica and Wading Rivers.

#### 3. Facilities

No facilities development has occurred on this tract.



D. Current and Proposed Development

Maintenance of Turtle Creek Rd. and parking lot is the only development occurring on this tract. No additional development is proposed.

KEY TO MAP SYMBOLS



Proposed Wildlife Habitat Development



Current Facilities and/or Proposed Facilities  
Development



Proposed Access Development



Maintained Field



Maintained Road

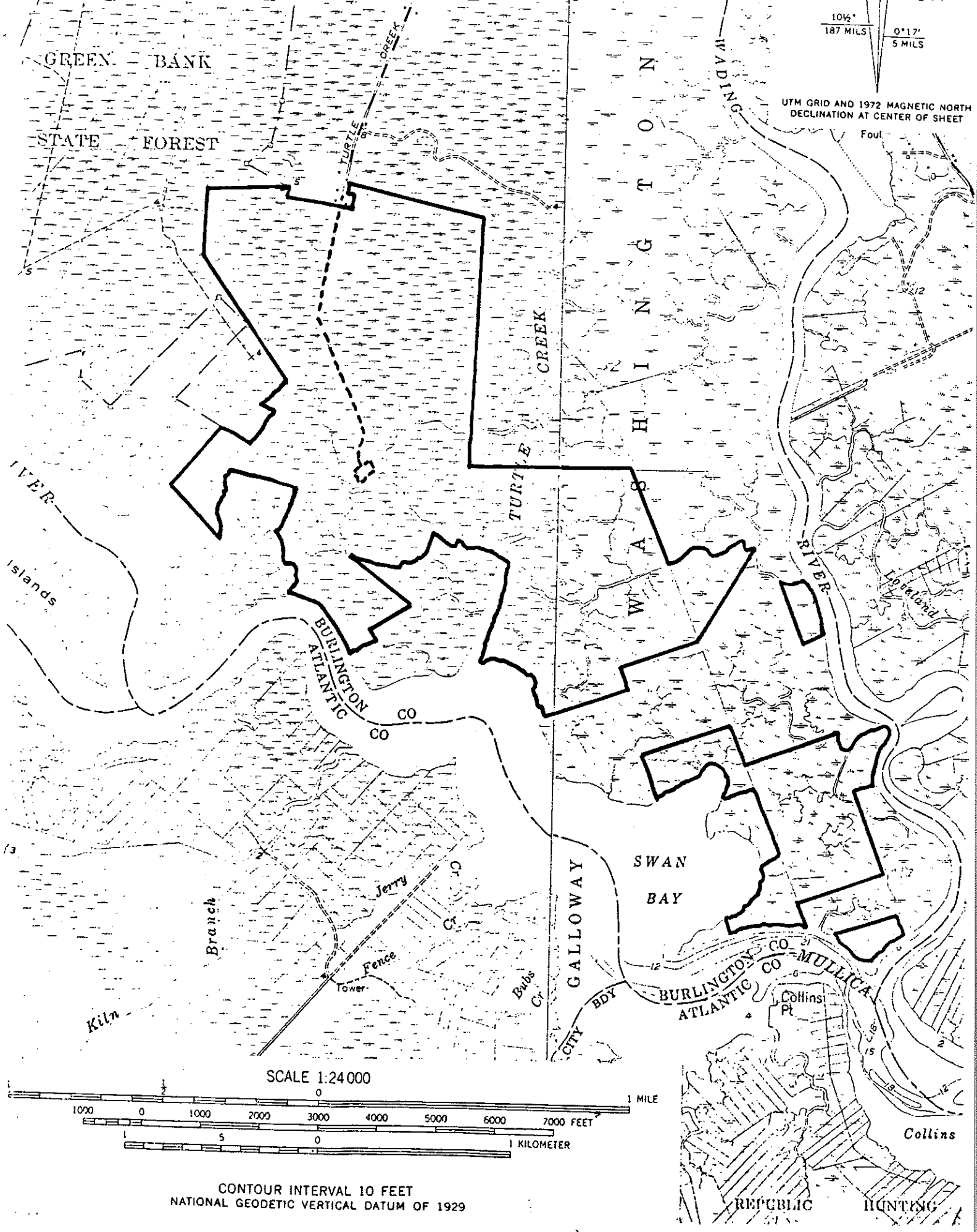


Parking Lot

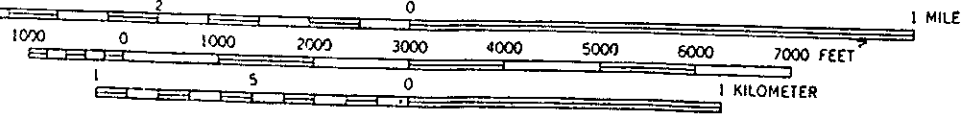
# FIGURE 5. SWAN BAY WMA

MN GN 30.  
 10 1/2° 187 MILS  
 0° 17' 5 MILS

UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



SCALE 1:24 000



CONTOUR INTERVAL 10 FEET  
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

**SYMBOLS**

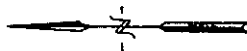
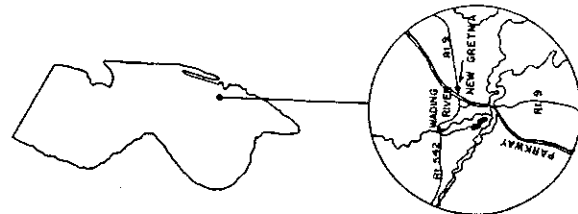
- ROAD (IMPROVED)
- ROAD (UNIMPROVED)
- TRACT BOUNDARY
- MARSH - UPLAND EDGE
- RIVER
- SALT MARSH
- FRESH MARSH



**SWAN BAY  
WILDLIFE  
MANAGEMENT AREA**

SCALE:  1 MILE

**FIGURE 5A: Endangered and threatened species locations on Swan Bay WMA**



## Port Republic Wildlife Management Area

### A. Introduction

Port Republic Wildlife Management Area is located in Galloway Township in northeastern Atlantic County. It covers approximately 755 acres and is entirely within the Preservation Area.

This tract was purchased through the 1961 Green Acres Bond Issue and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

About three quarters of Port Republic Wildlife Management Area, 570 acres, is salt marsh. The remaining area is composed of 37 acres of fields and 148 acres of woodland. With the exception of a few acres in the oak-pine forest type, all of the woodland on this tract is classified as hardwood swamp.

Tidal marsh soils, organic silts subject to daily flooding, dominate this tract. The lowland forest soil is from the Pocomoke series, while the soil of the upland areas is the relatively fertile Fallsington sandy loam.

Numerous tidal creeks run through the salt marsh portion of this tract while the Mullica River forms its northern boundary. No fresh-water ponds are present on the area.

Wildlife associations on the tract are those typical of the tremendously productive Atlantic Coast salt marsh, its edges and its associated waters. The tiger salamander is the only threatened or endangered species to have been observed on the tract (Figure 6A). White perch and striped bass populations in the Mullica River adjacent to this area are among the best in the state.

### C. Past Development

#### 1. Wildlife Habitat Management

Much of the field area on this tract was present at the time of acquisition. In 1968, the hedgerows separating the existing field areas were removed and the fields extended as far as possible without encroaching on wetland soils. Some of the field borders were planted with evergreens, autumn olive, bicolor lespedeza and sericea.

Forest management, as outlined in Part I, page 4, has been conducted on only about 5 acres of this tract since its acquisition.

Open Marsh Water Management, as outlined in Part I, page 15, has been conducted on all appropriate portions of the salt marsh area of this tract.

#### 2. Access

A road which provided fishermen access to the Mullica River was present on the tract at the time of acquisition but was impassible for much of the year. Soon after acquisition, this road was significantly improved and a parking lot, with a 50 vehicle capacity, was constructed at its terminus.

3. Facilities

No facilities development has occurred on this tract.

D. Current and Proposed Development

1. Wildlife Habitat Management

The 37 acres of fields on Port Republic Wildlife Management Area and are maintained on an annual basis utilizing the techniques outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, will be conducted on an average of about 5 acres of this tract per year.

2. Access

Maintenance of the road and parking lot is the only access type development activity occurring on the tract at this time. No additional access development is contemplated.

3. Facilities

No facilities development is contemplated for this tract at this time.

KEY TO MAP SYMBOLS

Proposed Wildlife Habitat Development

Current Facilities and/or Proposed Facilities  
Development

Proposed Access Development



Maintained Field



Maintained Road

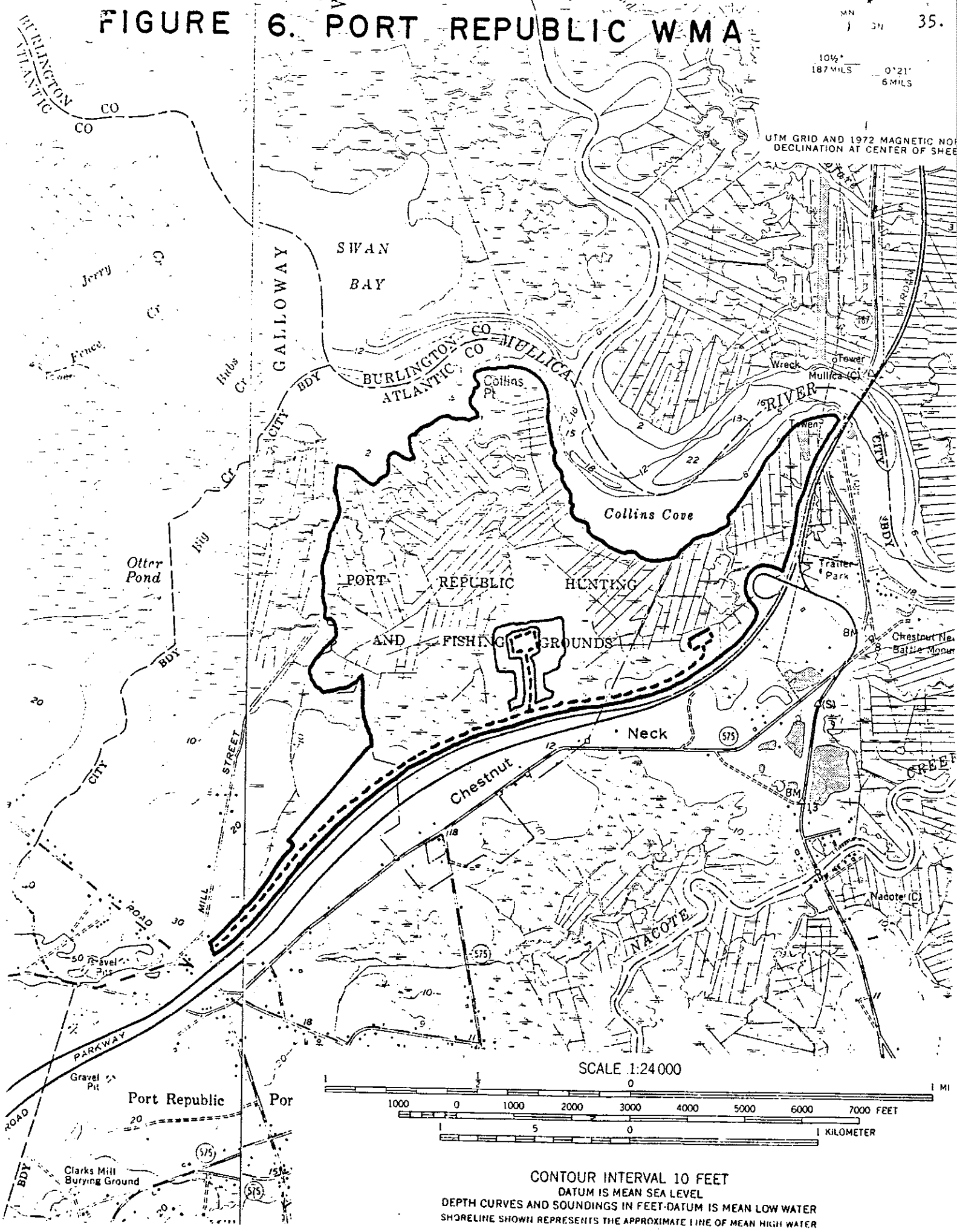


Parking Lot

# FIGURE 6. PORT REPUBLIC WMA

MN 35.  
 10 1/2" = 187 MILS  
 0"21' = 6 MILS

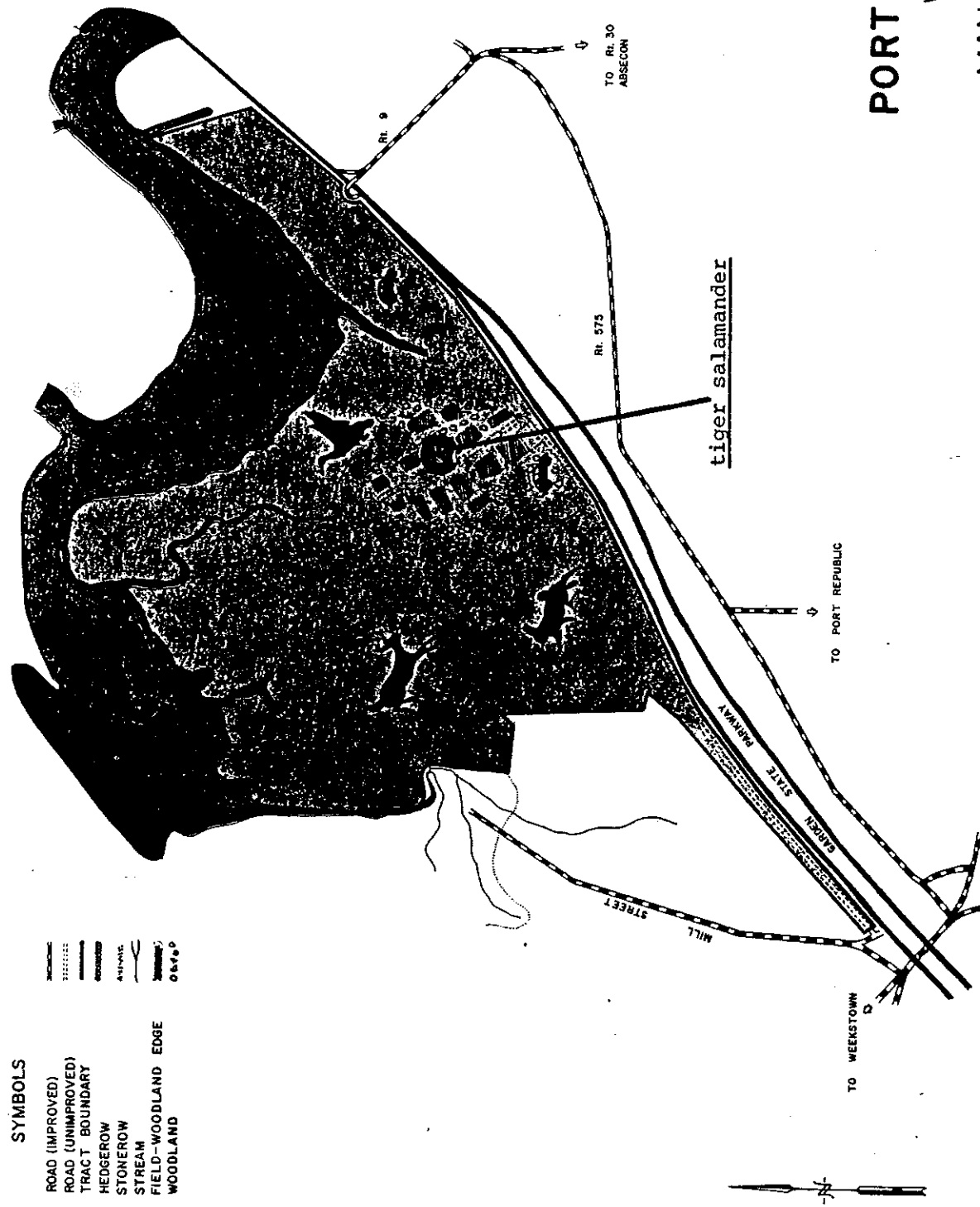
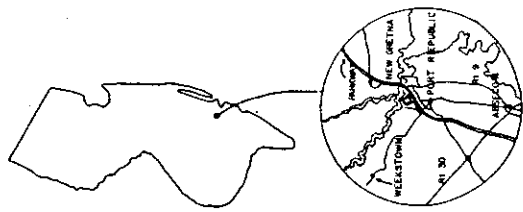
UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



SCALE 1:24 000

CONTOUR INTERVAL 10 FEET  
 DATUM IS MEAN SEA LEVEL  
 DEPTH CURVES AND SOUNDINGS IN FEET-DATUM IS MEAN LOW WATER  
 SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER





- SYMBOLS**
- ROAD (IMPROVED)
  - ROAD (UNIMPROVED)
  - TRACT BOUNDARY
  - HEDGEROW
  - STONEROW
  - STREAM
  - FIELD-WOODLAND EDGE
  - WOODLAND
  - ANYWAY
  - STAKE
  - POST

**PORT REPUBLIC  
WILDLIFE  
MANAGEMENT AREA**

SCALE: MILE

**FIGURE 6A: Endangered and threatened species locations on Port Republic WMA**

## Winslow Wildlife Management Area

### A. Introduction

Winslow Wildlife Management Area straddles the border between Camden and Gloucester Counties. It is located in Winslow Township, Camden County and Monroe Township, Gloucester County. It covers approximately 6,009 acres and is within the Pinelands Protection Area.

Part of this tract, 1,715 acres, was acquired in 1947 with monies derived from the sale of hunting and fishing licenses. The remainder, 4,292 acres, was acquired through the 1961 and 1971 Green Acres Bond Issues and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

Woodland covers the great majority of Winslow Wildlife Management Area. These woodlands are split almost evenly among upland and lowland forests. The upland forests are almost exclusively of the oak-pine classification. The lowland forests, are made up almost entirely of hardwood swamp. There are 103 acres of field on this tract.

Upland soils of the tract are from the Donwer-Woodstown-Dragston soil association. Those of the lowlands represent the Muck-Alluvial Land-Fallsington-Pocomoke soil association.

The Great Egg Harbor River bisects this area. In addition, numerous small tributaries course through the tract. Two groundwater table ponds, comprising about 32 acres of combined area, are present on the Camden County portion of the tract. These ponds are the result of gravel extraction operations conducted in conjunction with the building of the Atlantic City Expressway.

Wildlife associations on the tract are those typical of the periphery of the southern Pinelands. The ponds contain viable populations of introduced bass, minnows and sunfish. Endangered and threatened species observed on the tract include the Pine Barrens tree frog and the pine snake (Figure 7A).

### C. Past Development

#### 1. Wildlife Habitat Management

Since acquisition, about 8 acres have been cleared for additional fields on this tract. Shrub borders were planted around some of these new fields. They have been maintained using the techniques previously outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, has been conducted on only about 40 acres of this tract since its acquisition.

Cedar Pond, located south of the Atlantic City Expressway, was limed and fertilized in 1965. Additional lime was added in 1966 and 1969. In 1965, bass and fathead minnows were first stocked here; in 1967, creek chubsuckers, and at a later date, bluegills were introduced.

Oak Pond, located north of the Atlantic City Expressway, was limed and fertilized in 1965. Additional lime and fertilizer was added in 1969 and 1982. Bass and fathead minnows were first stocked here in 1965. Redear sunfish were introduced into the pond in 1968.

2. Access

The roads present on this tract at acquisition were improved and parking lots constructed to provide access to Oak and Cedar Ponds. No other access development has occurred on this tract.

3. Facilities

The Division of Fish, Game and Wildlife maintains its Southern District law enforcement office on this tract (Figure 7, W2). The office is housed in a farmhouse that was present on the tract at acquisition.

D. Current and Proposed Development

1. Wildlife Habitat Management

The 103 acres of fields on Winslow Wildlife Management Area are maintained on an annual basis utilizing the techniques outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, will be conducted on an average of about 15 acres of this tract per year.

Additional applications of lime and fertilizer, as outlined in Part I, page 9, are planned for Oak Pond (Figure 7, W5).

2. Access

Existing roads are maintained using small gravel pit located on the tract (Figure 7, W4). No additional access development is planned for this tract.

3. Facilities

Current plans call for a new DFGW regional office to be built on this tract when capital funding becomes available (Figure 7, W1). The building currently housing the Division's Southern District Law Enforcement Office will be eliminated upon completion of the new building.

A shooting range has been proposed on this area (Figure 7, W3) for development at some later date.



KEY TO MAP SYMBOLS

Proposed Wildlife Habitat Development

Current Facilities and/or Proposed Facilities  
Development

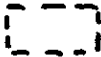
Proposed Access Development



Maintained Field



Maintained Road



Parking Lot

KEY TO FIGURE 7

- W 1 - gravel pit
- W 2 - administrative office
- W 3 - proposed shooting range
- W 4 - proposed administrative office structure
- W 5 - proposed liming and fertilization

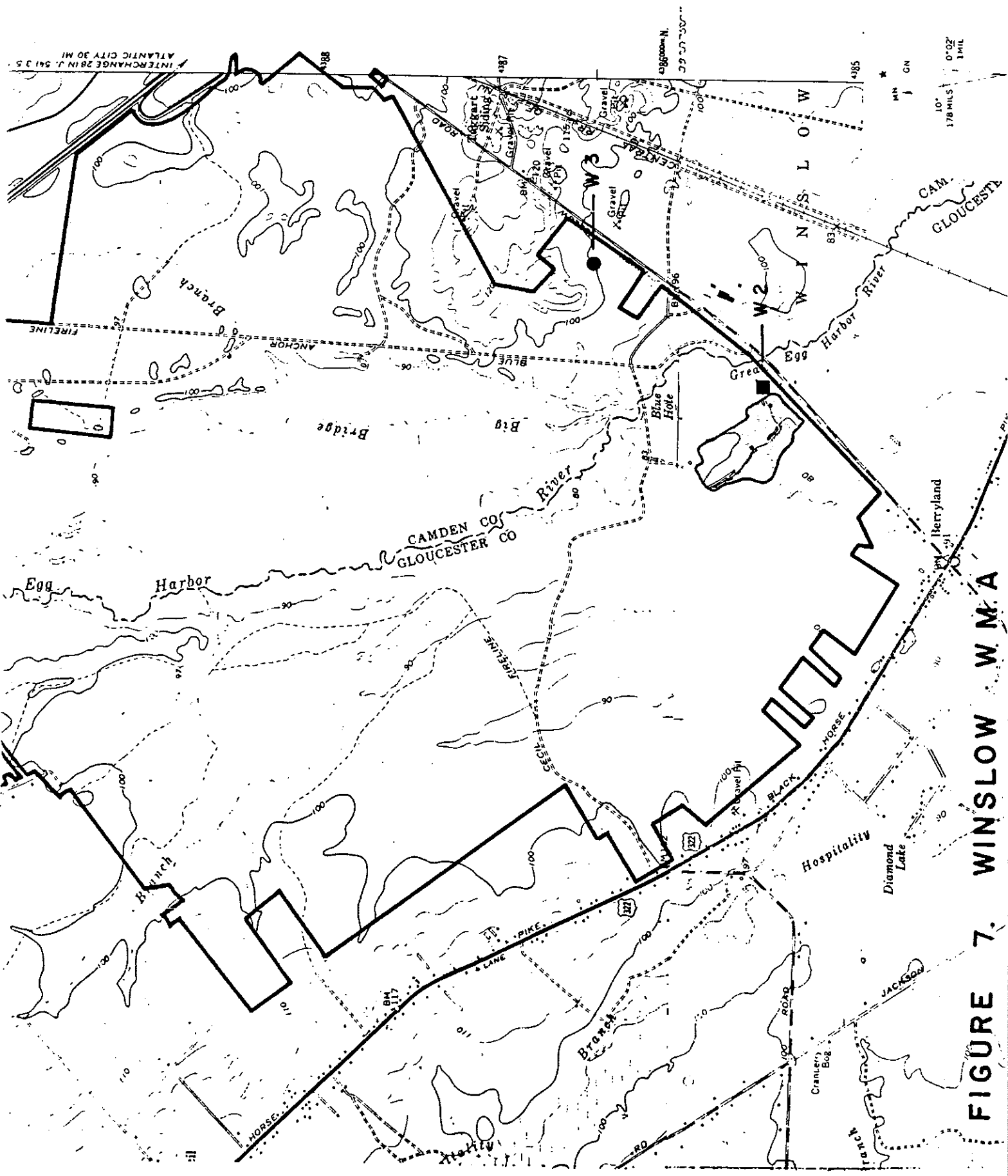
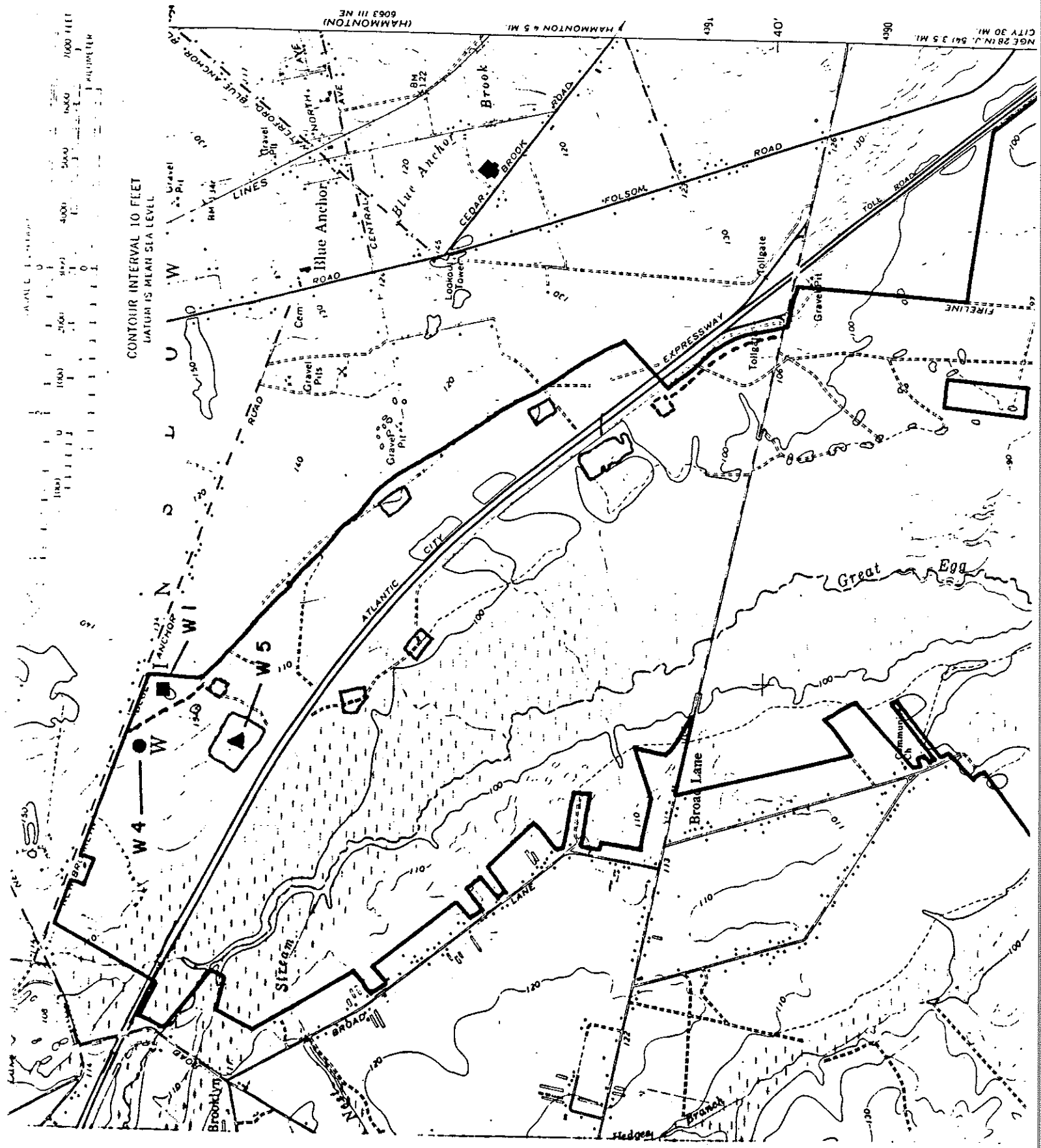


FIGURE 7. WINSLOW W.M.A.



CONTOUR INTERVAL 10 FEET  
LATITUDE IS MEAN SEA LEVEL

(HAMMONTON)  
6063 III NE

HAMMONTON 4.5 MI.

CITY 30 MI. 541 3.5 MI.

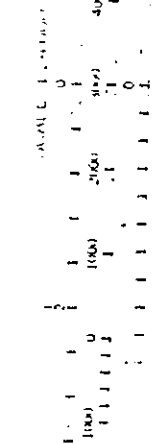







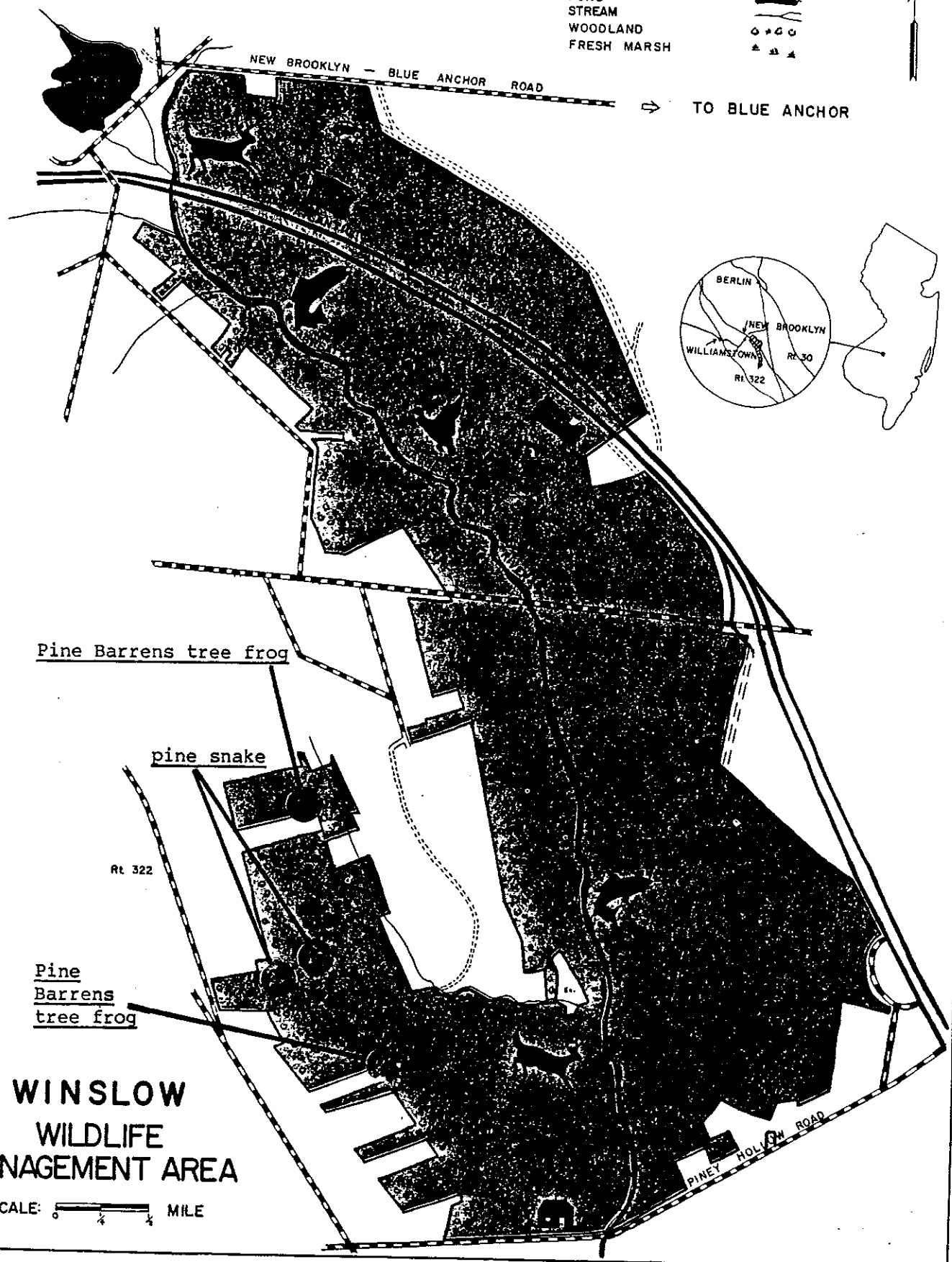


FIGURE 7A: Endangered and threatened species locations on Winslow WMA

SYMBOLS

- ROAD (IMPROVED) 
- ROAD (UNIMPROVED) 
- TRACT BOUNDARY 
- POND 
- STREAM 
- WOODLAND 
- FRESH MARSH 




Pine Barrens tree frog

pine snake

Rt 322

Pine Barrens tree frog

**WINSLOW  
WILDLIFE  
MANAGEMENT AREA**

SCALE:  MILE



## Peaslee Wildlife Management Area

### A. Introduction

Peaslee Wildlife Management Area is one of the state's largest wildlife management areas. It covers approximately 14,130 acres and is entirely within the Pinelands Protection Area. Most of the tract is located in eastern Cumberland County but also includes adjacent portions of Atlantic and Cape May counties.

The majority of tract, 9,642 acres, was purchased in 1954 with monies derived from the sale of hunting and fishing licenses. The remaining area, 4,487 acres, was acquired through the 1961 Green Acres Bond Issue and assigned to the Division of Fish, Game and Wildlife.

### B. Natural Characteristics

The great majority of Peaslee Wildlife Management Area is covered by upland forests. These are classified primarily as oak-pine with a small amount of the pine-oak forest type scattered throughout the tract. The lowland forest type, which covers about 1,500 acres, is made up primarily of hardwood swamps with a small amount of pitch pine lowland. Some small acreages of Atlantic white cedar swamp are present in the northern portion of the tract. Approximately 280 acres of field are maintained on this area.

Two soil associations are present in the uplands of the tract: Downer-Hammonton-Sassafras and Sassafras-Aura-Woodstown. Both associations are nearly level and well drained. Lowland soils are representative of the Atsion-Muck-Pocomoke association.

The western section of this tract is drained by the Mannumuskin Creek and Nixon's Branch. The Tuckahoe River courses through and drains the eastern portion. One pond, about 17 acres in size, is located on the tract.

Wildlife associations are those typical of the southern Pinelands region. Outstanding populations of deer, quail and grouse are present here as a result of habitat management for their benefit. Turkeys, re-introduced to the region in 1980, are seen regularly on the tract and are increasing in numbers. Endangered and threatened species observed on the tract include the Pine Barrens tree frog and the tiger salamander (Figure 8A). Unlike most streams in the area, the Tuckahoe River supports an anadromous run of Alewife herring.

### C. Past Development

#### 1. Wildlife Habitat Management

Approximately 280 acres have been cleared for fields on this tract. Approximately 8 miles of border planting have been made around these fields using *Lespedeza bicolor*. These fields have been maintained utilizing the techniques previously outlined in Part I, page 7.

Forest management, as outlined in Part I, page 4, has been conducted on approximately 200 acres of this tract since its acquisition.

2. Access

Approximately eight miles of access roads have been constructed or rebuilt on this tract since acquisition. No other access type development has occurred.

3. Facilities

No facilities development has occurred on this tract.

D. Current and Proposed Development

1. Wildlife Habitat Management

The 280 acres of fields on Peaslee Wildlife Management Area are maintained on an annual basis utilizing the techniques outlined in Part I, page 7. Current plans call for the clearing of about 10 acres of new fields per year on this tract with a cumulative maximum of about 200 acres of additional fields.

Forest management, as outlined in Part I, page 4, will be conducted on an average of about 30 acres of this tract per year.

The restoration of a series of four former cranberry bogs is planned for this tract when funds become available (Figure 8, P2). Water level management for fish and/or waterfowl, as outlined in Part I, pages 10 & 11, may be utilized in some of the impoundments resulting from this project.

2. Access

Current plans call for the development of short secondary roads and small parking areas to provide access to the above mentioned project should it be undertaken. Other than maintenance of the existing roads, no additional access type development is planned for this tract.

3. Facilities

No facilities development is anticipated for this tract at the present time.

KEY TO MAP SYMBOLS



Proposed Wildlife Habitat Development



Current Facilities and/or Proposed Facilities  
Development



Proposed Access Development



Maintained Field



Maintained Road



Parking Lot

KEY TO FIGURE 8

P 2, - proposed dam restoration

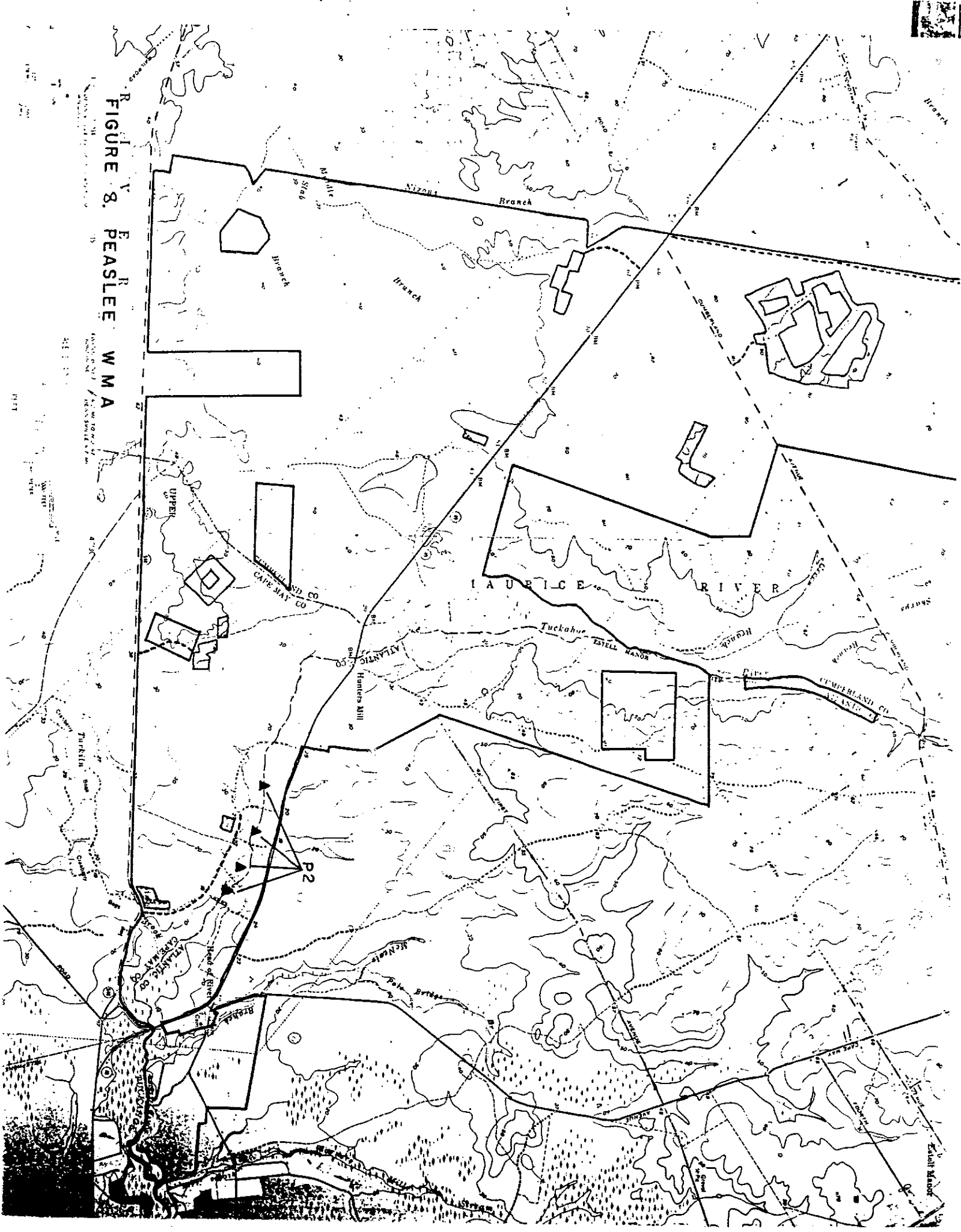
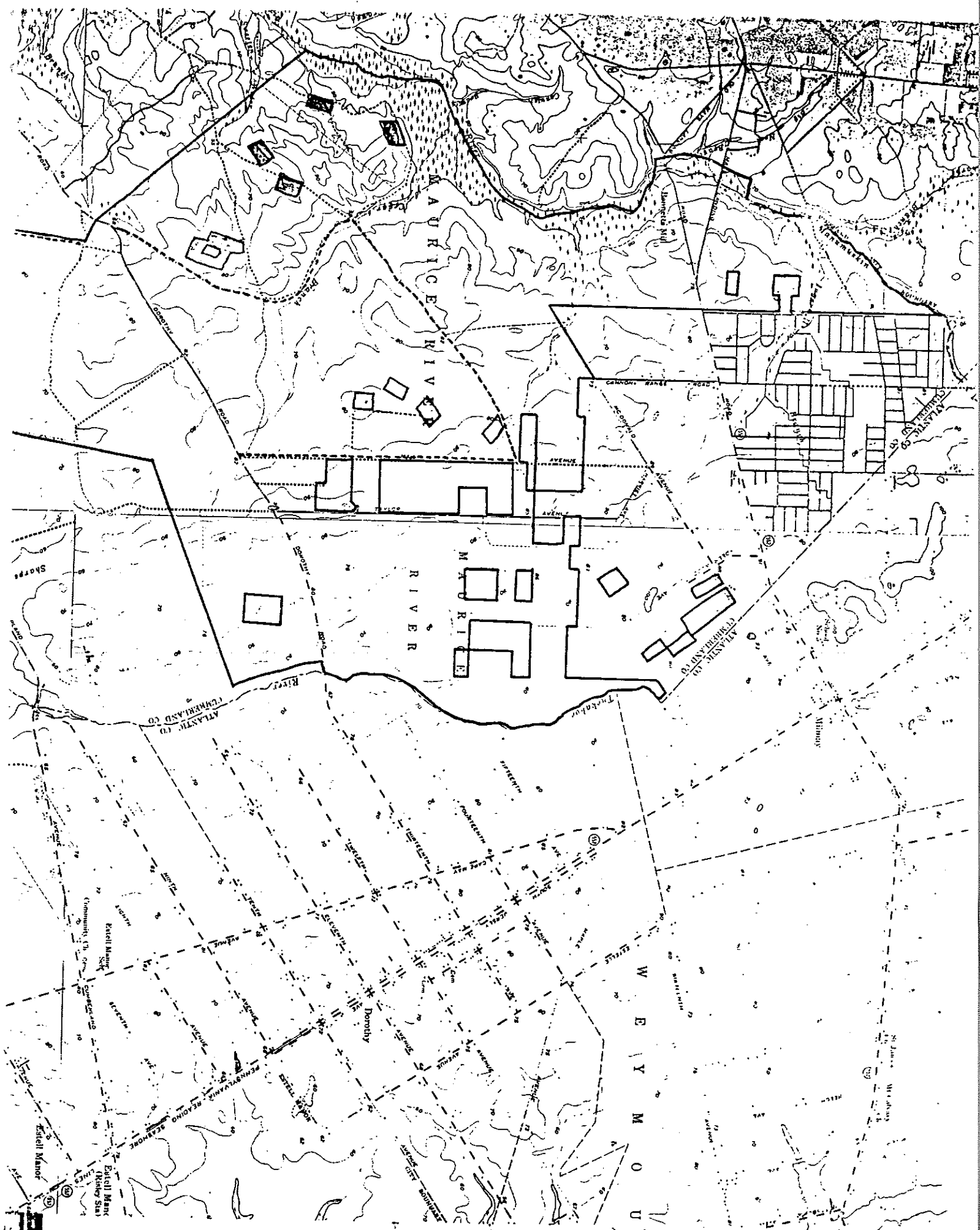


FIGURE 8. PEASLEE WMA

GA. STATE GEOLOGICAL SURVEY  
 GEORGIA  
 1973





# PEASLEE WILDLIFE MANAGEMENT AREA

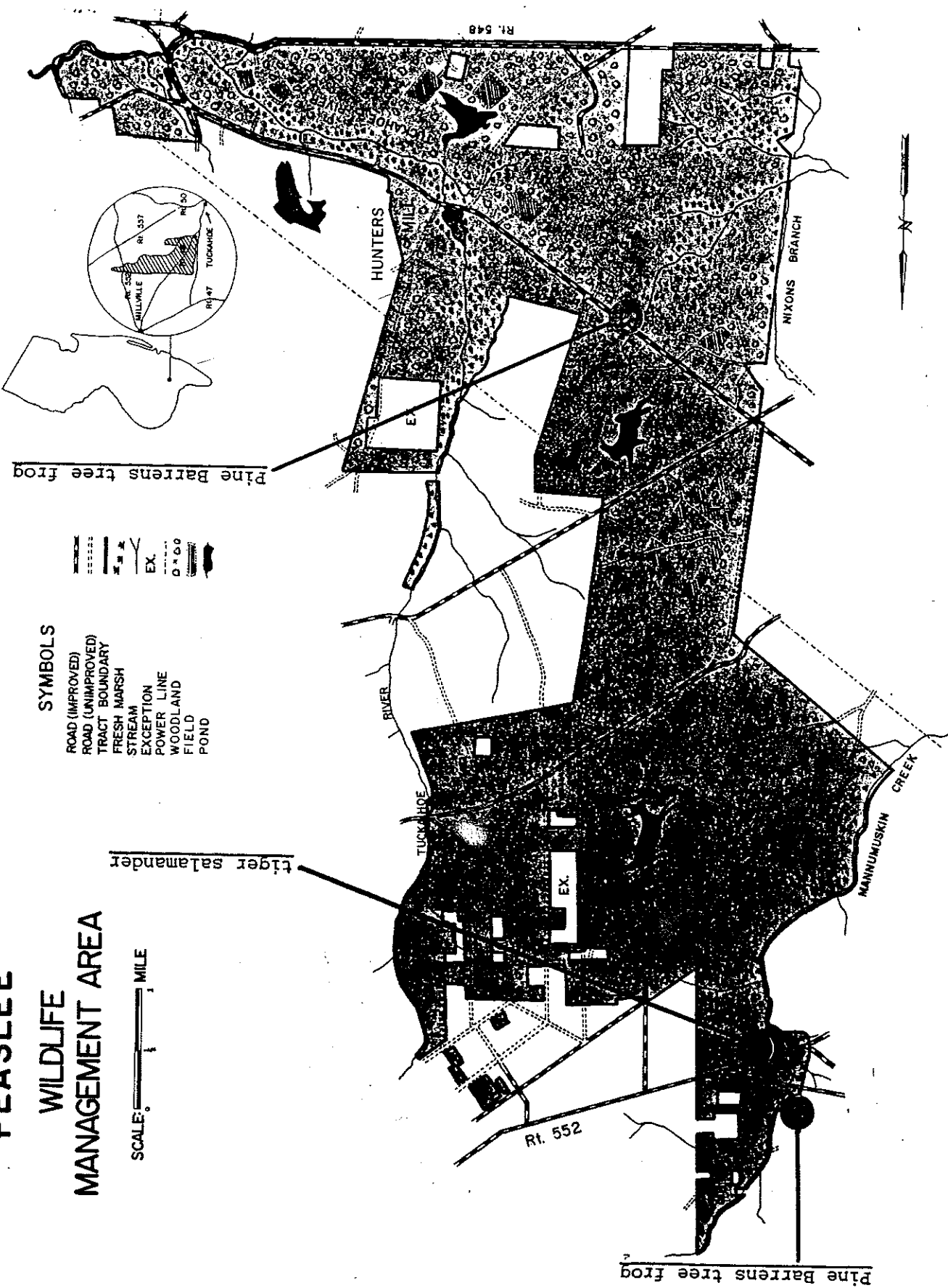
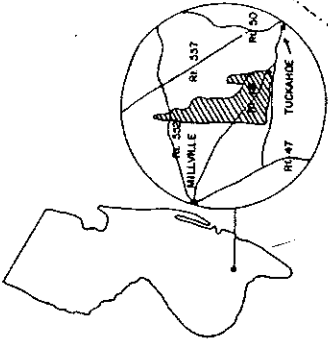
SCALE: 1 MILE

- SYMBOLS**
- ROAD (IMPROVED)
  - ROAD (UNIMPROVED)
  - TRACT BOUNDARY
  - FRESH MARSH
  - STREAM
  - EXCEPTION
  - POWER LINE
  - WOODLAND
  - FIELD
  - POND



Pine Barrens tree frog

tiger salamander



Pine Barrens tree frog

FIGURE 8A: Endangered and threatened species locations on Peaslee WMA