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UPLAND LIVING RESOURCES: ENDANGERED, THREATENED, AND RARE WILDLIFE

A Staff Working Paper

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Richard A. Kantor

U.S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

October, 1976

New Jersey Department of Environmental Protection
Division of Marine Services
Office of Coastal Zone Management
P. O. Box 1889
Trenton, New Jersey 08625

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Note: This staff working paper is one of a series of Issue and Policy Alternative Papers presenting facts, analyses, and conceptual policy alternatives on coastal resources and coastal land and water uses. The purpose of this draft document is to stimulate discussion and comments that will assist preparation of the management program for the New Jersey coastal zone. This report was prepared in part with financial assistance from the National Oceanic and Atmospheric Administration under the federal Coastal Zone Management Act, P.L. 92-583.

Comments, criticism, additions, and suggestions are welcome and should be addressed to the New Jersey Office of Coastal Zone Management.

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INTRODUCTION

Over 500 species of mammals, birds, reptiles, and amphibians have been recorded to occur in New Jersey (Applegate, 1974). Of these, 90 species have been designated by the New Jersey Department of Environmental Protection as endangered, threatened, peripheral, or undetermined status. The populations of these animals is precariously low or decreasing, mostly due to the effects of human activities. Extinction of endangered species within the state could result unless strong protective measures are ensured.

This paper is intended to further debate on important issues relating to preservation of endangered and rare wildlife species. This first section briefly defines these issues in the coastal zone and then presents alternative policies which could be incorporated in the coastal zone management program in New Jersey.

Section III describes environmental characteristics and natural factors which affect endangered and rare wildlife in coastal New Jersey. The various habitats are defined.

Section IV analyzes endangered wildlife from a historic perspective, present problems, human interaction, and some management problems.

Three appendices conclude the paper. First, tables are presented which generally list the occurrance of endangered

and rare wildlife in specific habitat types, and summarize habitat dependency. The second appendix discusses possible management tools which could be used to implement endangered wildlife policies. The final appendix provides reference sources.

I. ISSUES

Certain species of wildlife face local, state, or total extinction unless present development trends are altered. Destruction and alteration of critical habitats is the most important factor effecting these "listed species" (species listed as endangered, threatened peripheral or undetermined by the Department of Environmental Protection, Division of Fish, Game and Shellfisheries). Specific sites, habitats, habitat complexes and regions of value to listed species must be protected if populations of these species are to be perpetuated for future generations.

Direct exploitation of listed species has in the past had great influence on their numbers and distribution. Though State regulations exist today making such exploitation illegal, problems of enforcement continue. Migratory species may face exploitation outside the state or country which affect state populations. Pollutants, especially pesticides, have adversely effected wildlife populations in the past and continue to threaten species existence. Many species exibit behavior that has made them incompatible with man and his activities. Such behavioral patterns have contributed to reductions of many listed species.

A lack of knowledge presently exists regarding current status, distribution, factors contributing to scarcity, habitat needs and possibilities for management of listed species. This hampers programs aimed at stabilizing, or increasing numbers of such species and maintaining their needed habitats.

II. POLICY ALTERNATIVES

1. Protective status could be given to sites, habitats and regions based on their value to maintaining listed species. Information regarding individual sites and regions of value to listed species could be mapped. Scale of such mapping would depend on use: small scale maps could be used for reference and planning, while large scale maps would be necessary for some types of regulatory control. (Presently, information available to state and local environmental officials is scattered or non-existent.)

2. A cooperative program could be encouraged to gather existing data concerning present status and distribution of species in the coastal area. Sources of such information would include: federal, state, county, and local wildlife experts, private university and wildlife organizations.

3. A policy could be instituted to maximize protection of listed species from human exploitation. It would also give increased publicity to problems facing listed species, hopefully increasing public support of existing legislation and programs.

4. Migratory species facing problems outside New Jersey would benefit from increased protection on a Federal level. The state could encourage the inclusion of state listed species into federal listing and protection.

5. A program could be instituted to discourage or prohibit impacting activities, including discharge of pollutants and use of pesticides, adversely effecting listed species.

5. Research and management programs of listed species in the coastal zone could be initiated. Sixteen species listed as "undetermined status" and present in the coastal zone, should be investigated as to their present status and reclassified. Status of listed species populations, especially those endangered or thought to be declining could be monitored on a regular basis to determine population trends and environmental problems. Research in cooperation with other agencies would attempt to stabilize, maintain or increase populations of listed species. Such research could consider reasons for present status, needs of species and potential for management.

III. ENVIRONMENTAL CHARACTERISTICS AND NATURAL FACTORS

The physical characteristics of an area play a strong role in determining the distribution of wildlife species. Soil, topography, hydrologic conditions, and climate have shaped the vegetative communities found within the New Jersey Coastal Zone. Natural processes such as frequency of fire, flooding, and vegetative succession help determine vegetation type of specific sites.

A. Wildlife Habitat Types in the Coastal Zone

Natural factors and human activities have combined to establish, perpetuate and alter various habitat types. The classification of these is somewhat arbitary. For the purposes of this report, eleven identifiable New Jersey types are distinguished. These are listed and defined below.

Marine - ocean waters seaward from mean high tide line along the Atlantic coastline from Sandy Hook south to Cape May Point.

Aquatic - permanent areas of freshwater, either tidal or non-tidal such as streams, rivers, lakes, or ponds.

Barrier Beach - areas supporting natural dunes and/or barrier beach vegetation which includes beach grasses *Ammophila* sp., beach plums, poison ivy, block cherry, red cedar, etc. These areas primarily are limited to State and Federal owned

open space along the Atlantic Ocean Coastline. Barrier beaches along with salt marsh and tidal waters together comprise the estuarine zone.

Salt Marsh - low-lying areas supporting vegetative species adapted to twice daily tidal flooding with brackish water. *Spartina alterniflora*, *S. patens*, *Distichlis spicata*, *Iva frutescens*, and *Baccharis halimifolia* are dominant plant species. Tidal wetlands (salt marshes) have been delineated by the Department.

Freshwater Marshes - tidal or non-tidal vegetated areas with wet mucky soils not innundated with saline waters. Dominant plants include: cattail, *Typha*, sp., wild rice, *Zizania*; yellow water lily, *Nuphar advena*, and common reed, *Phragmites communis*.

Bogs - low lying open areas with a seasonal high groundwater table, frequently underlain with peat, and with very poor drainage. Common bog plants include leatherleaf, laurel, swamp azalea, cranberry, sphagnum moss, sedges, pitcher plant, sundews and curly-grass ferns. These plants are adapted to waters extremely acidic and of low fertility.

Lowland Swamp Forest - three distinct vegetative swamp forests are found in the state: Atlantic white - cedar forest, Pitch Pine lowland forest, and hardwood swamp forest with red maple, blackgum, and sweetbay as dominant species. Lowland forest are only found in drainage areas-frequently flood plains.

Pine Forest - upland wooded areas of Pine Barrens supporting predominantly pitch pine and short-leaf pines. Black cherry and black oaks are also common but less abundant. Blueberries are common in understory. The Plains - or Dwarf Forests - is a unique forest type of stunted blackjack oaks, and closed cone (serotinous) race pitch pines found only in Burlington and Ocean County. Soils are arid.

Hardwood Forest - upland areas of northern and southern New Jersey dominated by mixed hardwoods. Common trees include: scarlet, white, and black oak, hickory, tulip tree, dogwood, and sassafras. Pitch pine and short-leaf pine are frequently mixed in southern New Jersey where as hemlock is more common in northern New Jersey.

Agricultural Fields - areas presently or recently under cultivation. Common field crops include blueberries, soybeans, corn, tomatoes, potatoes, and wheat. Except for blueberry fields, this habitat is restricted tc inner coastal plain region, and portions of Cape May, Cumberland, and Monmouth Counties.

Meadows and Grasslands - moderatly moist open areas with fertile soil, dominated by grasses. This includes pastures and savannas.

Urban - area developed into cities, town, industrial or residential uses, excluding rural hamlets.

B. Endangered and Rare Wildlife Habitats

All species of wildlife are dependent upon their environment for survival. These requirements can be quite specific or less specific for more adaptable species. Generally, endangered, threatened, peripheral and undetermined status species (as officially listed in the State Department of Environmental Protection and hereafter referred to as "listed" species) have more restrictive requirements than more common species. Habitats used by listed species are therefore of great interest and importance to their continued existence.

Table 1 summarizes the habitat preference of each species of endangered, threatened, peripheral, or undetermined wildlife listed in the New Jersey Register (1975).

Status designation are taken directly from official listing (New Jersey Register, 1975). Definition for each status are as follows:

ENDANGERED - A species of native fish or wildlife shall be regarded as threatened with extinction whenever its existence in New Jersey is endangered because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of overexploitation, disease, predation, or because of other factors, and that its survival requires assistance.

THREATENED - May become ENDANGERED if conditions surrounding the species begin or continue to deteriorate.

PERIPHERAL - A species (usually a mammal, amphibian or reptile) whose occurrence in New Jersey is at the edge of its present natural range and which may be threatened with extinction within New Jersey although not in its range as a whole. Special attention may be necessary to assure retention in the State's fauna.

STATUS UNDETERMINED - A species that has been suggested as possibly threatened with extinction, but about which there is not enough information to determine the status. More information is needed.

Relative importance of various habitat types to listed species are to some degree reflected by the number of such

species they support (Table 2). Aquatic areas support by far the highest number of species (42), but include 14 marine mammals (whales) and 5 marine reptiles (sea turtles) which are seldom found within state waters. Other habitats support from 12 to 20 species except for urban areas which support only 4. Within phylla some trends of habitat use are notable. Barrier beach habitat is used by the highest number of birds (15) with agricultural fields, salt marshes and freshwater marshes also receiving high use. Reptiles and amphibians use pine forests, lowland swamp forests and aquatic areas more than other habitat types.

Because most species use more than one habitat type, improved understanding of species needs may result from reviewing the number of listed species supported by major communities of the coastal zone. Habitat types similar or adjacent to each other can be lumped into six major communities: Marine (aquatic-marine habitat); Estuarine and Barrier Beach (aquatic-estuarine, salt marsh, and barrier beach habitats); Freshwater Wetlands (aquatic-fresh, freshwater marsh, bog and lowland swamp forest habitats); Forests

(pine forest and hardwood forest habitats); Open Lands (argicultural fields and meadow grasslands habitats); Urban (urban centers). Freshwater wetland communities support the greatest number of listed species (36), followed by the marine community (33) and range down to the urban community (4) (See Table 3). Generally, aquatic and water dominated communities support greater numbers of listed species than dry upland habitats. This is notably similar to endangered and rare vegetation distributions within the coastal zone (See Issue and Policy Alternative Paper, Upland Living Resources: Endangered and Rare Vegetation). The majority of endangered coastal vegetation is found in moist habitats.

Value of various habitats to listed species is not only dependent on the number of species using such habitat, but also the intensity and type of use, the time of year for which the habitat is critical for species survival and scarcity or vulnerability of such habitat. Habitat infrequently used by a species or a habitat casually passed through during migration is of less value than habitats heavily used by species or on which they are specifically dependent. Habitats that are rare or disappearing are worthy of more concern than those which are common, even though in some cases, they support fewer listed species.

IV. ANALYSIS

A. Historical Perspective

Problems presently facing rare species can be viewed from a historical perspective. Species now extinct or previously threatened in the coastal zone of New Jersey (Table 4) serve to point out the varying problems presently threatening wildlife existence. The passenger pigeon, exterminated by the 1900's was heavily exploited by market hunters. Flocking (as with the eskimo curlew and many shorebirds) and colonial nesting increased the opportunity for exploitation, a single shot into a flock killing many individuals. Passenger pigeons required extensive natural oak and beech forests to provide food. Farming, land clearing and the expanding influences of man destroyed the continuity of such habitat and hastened their demise. Low tolerance to change, natural disasters affecting remaining flocks, and altered behavior once large flocks were broken up, have been advanced as reasons for final extinction of this species.

Many species were reduced in number by unrestricted hunting combined with destruction of habitat. The heath hen, white-tailed deer, turkey, mountain lion, black bear and wolf were heavily exploited for food, fur, sport or because of their predatory habitats (real or imagined). Many of these species may have survived better if their needed habitats had not been greatly altered by agricultural and other land uses of man. Some bird species: shorebirds, snowy egret, and wood duck were heavily hunted for feathers.

These returned to common status once market hunting was restricted. Deer, almost gone from New Jersey around 1900, quickly returned to become a common game species after hunting was restricted and beneficial habitat changes took place. The anadromous Atlantic shad suffered from degradation of river systems whose quality is essential for breeding and survival of young.

B. Problems Facing Rare Wildlife

Species of animals occupy various locations in community food chains (tropic levels). A simplified example of a food chain would be plants (producers) being eaten by rabbits (herbivors-plant eaters), which are in turn eaten by hawks (predators). Predators high in the chain tend to exist in lower numbers than species lower tropic levels. Predators and secondary predators have the disadvantage of naturally smaller populations and are therefore more threatened by factors reducing species numbers. Generally factors leading to reductions of rare species remain problems today. They are:

1. Habitat destruction and degradation
2. Exploitation by man
3. Pollution (including pesticides)
4. Natural behavioral patterns

Analysis of problems facing listed species can be divided into these four topics, though factors work together (synergistic) to threaten many species.

1. Habitat Destruction and Degradation

Habitat destruction and degradation is the major problem facing wildlife populations in New Jersey (See Issue and Policy Alternative Paper, Upland Living Resources: Upland Wildlife Habitat). With listed species however, extinction may be the result of continuation of present trends. Listed species, expecially those with restricted habitat needs, require protection of remaining habitat which supports them. Rare habitats, including aquatic habitats, subject to degradation and specific combinations of habitats appear of greatest concern.

Barrier beach islands have been highly exploited by man. Most have little remaining natural vegetation. This rare habitat is crucial to great numbers of birds during fall migration, including many listed species. It is also the winter home of the Ipswich sparrow, listed as threatened by both the State and Federal governments. This species is found exclusively in this habitat type and is dependent on

natural dunes for its survival. Many species depend on rare or specific decreasing freshwater wetland types for survival. The Eastern tiger salamander and gray treefrog are dependent largely on gravel pit ponds, obviously rare. The bog turtle is dependent on isolated pockets of highly specialized habitat, sphagnum bogs, swamps and marshy meadows having clear bottoms. The Pine Barrens treefrog and the carpenter frog greatly depend on the Atlantic white-cedar swamps, a relatively rare but productive habitat. Meadows support several listed species. The Henslow's sparrow and short-billed marsh wren rely on sedge habitat. The upland plover, short-eared owl, bobolink, and vesper sparrow are almost totally dependent on open habitat, particular meadows and fields. The marsh hawk nests almost exclusively in cattails and salt marshes.

Complexes of habitat types are critical for many listed species. Amphibians usually need suitable forested uplands adjacent to their specific breeding wetlands. Low mobility of these species requires that such habitats be in close proximity. Birds such as the osprey, bald eagle and yellow-crowned night heron need forest nesting sites near the

areas where they catch fish. Often specific habitat requirements or requirements of combinations of habitats are largely unknown.

2. Exploitation by Man

Over exploitation, long a problem to wildlife, has been greatly restricted by State and Federal legislation. Special protection exists on State or Federal levels for many endangered or threatened species, nevertheless over-exploitation remains a problem causing endangerment of some species. Hawks, eagles, and owls have long been persecuted because of their predatory habits. Though illegal, and of no real value in maintaining game species numbers, killing of predator birds, including listed species, continues. Falconers to often harass or rob nests of raptors, illegally, to obtain birds for their sport. Endangered species, valuable because of their scarcity are sought out and collected for sale to zoos or private individuals. The bog turtle and other rare reptiles and amphibians may be subject to significant exploitation from this source. Species which are migratory and present in New Jersey for only part of their lives may face exploitation problems outside the state. Few species listed in New Jersey are given special Federal status (Table 5). While protection may be adequate within New Jersey, protection in other states or outside the country may be limited or non-existent. Marine reptiles and mammals, especially those of commerical value, have been greatly reduced in number in all oceans of the world. Listed species

occur in state coastal waters only rarely, often beached when sick or injured. The Division of Fish, Game and Shellfisheries has developed a procedure to deal with such occurences. Some birds are highly migratory and may face problems of habitat destruction, exploitation or contamination from pollutants on their travels to other states and countries. Solutions to such problems can only be accomplished on the Federal level through cooperative efforts of all states which they pass.

3. Pollution

Pollution in its many forms, affects a number of listed species. Direct effect on survival and reproductive ability or degradation of needed habitats are the main problems.

Energy stored in body tissues pass through the food chain eventually reaches those species at the top. Some chemicals which are retained in lower animals in lesser concentrations, tend to concentrate at high levels in species high in the food chain. Predators accumulate the sum of such materials found in their prey. This process is called biomagnification. Potential toxins, such as chlorinate hydrocarbons (pesticides such as DDT) are concentrated in

specific organs, such as ovaries, with high fat content. Reproductive inabilities in birds, resulting from this process have been well documented.

The osprey, bald eagle, and peregrine falcon have undergone drastic reductions over large portions of their ranges due to pesticides. Ospreys once had their highest breeding populations in Long Island and New Jersey. Reproductive success in New Jersey has been poor in recent years. Restrictions in the use of DDT has resulted in some signs of recovery. Only a single bald eagle pair was known to nest in New Jersey in 1976. Peregrine falcons have not bred successfully for many years in the U.S. east of the Mississippi River. In New Jersey, the Palisades was once a productive breeding area for these birds. Effects of pesticides to other species are not entirely known. Eleven of the 28 birds on the state list are raptors. Indications are that effects of pesticide and other pollutants which concentrate in the food chain reach a variety of listed raptors and other predators besides the three discussed here. Pesticide use has killed large numbers of songbirds. Orchard orioles exist mostly in rural farmlands and in orchards where pesticides are not used. Various pollutants effect water quality discouraging use by amphibians and fish. Breeding sites of amphibians, often specific as to pH and other water characteristics, can easily be altered by pollutants to eliminate successful breeding. Fishes, particularly anadromous species, are susceptable to effects of pollution. Five of seven listed fish species are anadromous, breeding

in fresh water but living most of their lives in the sea. Such species must navigate estuaries and river systems to reach breeding sites sometimes in small streams. Pollution blockages, including thermal pollution, may prevent this upstream migration or foul breeding sites thereby preventing successful breeding.

4. Natural Behavior Patterns

Animal behavior covers a large range of topics, some already discussed, which effect the survival capabilities of various species. Listed species are often unable to adjust to man's activities or vulnerable to persecution by man. Obvious examples include problems faced by migrating species. Anadromous fish are often prevented from moving upstream by the construction of dams. Migratory birds flying at night, often collide with lighthouses, buildings or telephone wires. Other species often fall prey to automobiles, this is true of many less mobile reptiles and amphibians as well as bird species. The red-headed woodpecker, a prime example, tends to swoop low over roads when feeding or flying from tree to tree. Flocking, colonial nesting, or ground nesting species face a disadvantage due to their increased potential for harassment by man and his domestic animals. Flocking

birds have received greatest damage from unrestricted or illegal hunting. Some species, besides ones at the top of the food chain, appear to have never been present in large numbers in New Jersey, though it is within their range. Among birds, whose past and present occurrence is well documented relative to members of other phylla, the king rail, yellow rail, roseate tern, and Ipswich sparrow would fall in this category. Species adaptation which limit numbers in this way are not clearly understood. Perhaps the listed species, most unfortunate in terms or behavior, are those which directly interfere with or endanger man and his domestic animals. Eagles, hawks, owls, mammalian predators such as bobcat and black bear, and timber rattlesnakes are listed species which have been or continue to be limited by man because of their habits or reputations whether real or imagined.

C. Information Needs

Determination of species status, needs, and potential for management are not well known for many listed species. Twenty-three of 73 species listed are of undetermined status. Others may have changed in status since the list was published. Species not currently listed may be added to the list if numbers are decreasing or threatened. For most listed species there is no ongoing program to monitor populations. Fragmented field observations presently supply information regarding change in status. Information regarding species

distribution, important breeding sites, migration stops and wintering areas of endangered species are not well known. This information is fragmentary and when present not compiled by any one agency or in any one location. Maps of this information are not available to check the effects development of particular sites on listed species.

Needs and potential for management of listed species are little known. Many species have become rare for unknown reasons. Knowledge of habitat needs varies greatly among species, publicly recognized or economically important species generally have attracted more research and concern. The Non-Game and Endangered Species Project, Division of Fish, Game and Shellfisheries has coordianted research and management of certain listed species. Unfortunately, such activities so far have been largely confined to a few specific species such as the peregrine falcon, osprey, bog turtle and eastern tiger salamander. Little or no other management specific to listed species in the coastal zone has been initiated by other agencies or groups. Without management, recovery of many listed species is doubtful.

APPENDIX A
TABLES

Table 1. Habitats used by endangered, threatened, rare and peripheral animals in New Jersey. (Table prepared in cooperation with personnel of the Endangered and Nongame species Project, NJ Division of Fish, Game, and Shellfisheries.)

Animals (status) Mammals		Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	Fresh Water Marsh	Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
				HABITATS											
Long-Tailed Shrew Sorex dispar	(u)	north	no	-	-	-	-	-	-	-	-	-	-	-	Specific habitat use unknown
Water Shrew Sorex palustris	(p)	north	no	x	-	-	-	x	-	-	-	-	-		
New England Cottotail Sylvilagus transitionalis	(p)	north	no	-	-	-	-	-	x	-	x	-	-	-	
Snowshoe Rabbit Lepus americanus	(p)	north	no	-	-	-	-	-	x	-	x	-	-	-	
Porcupine Erethizon dorsatum	(p)	north	no	-	-	-	-	-	-	-	x	-	-	-	
Indiana Bat Myotis sodalis	(e)	?	no												One known record in N.J.
Keen's Myotis (Bat) Myotis keenii	(t)	state	yes	-	-	-	-	-	-	-	x	-	-	x	
Eastern Woodrat Neotoma floridama	(p)	north	no	-	-	-	-	-	-	-	x	-	-	-	
Woodland Jumping Mouse Napeozapus insignis	(u)	north	no	-	-	-	-	-	-	-	x	-	-	-	
Southern Bog Lemming Synaptomys cooperi	(t)	state	yes	-	-	-	-	x	x	-	-	-	x	-	colonial

(e) = endangered
(t) = threatened
(p) = peripheral
(u) = undetermined
(x) = occurrence in habitat

Sources: Applegate (1974) Collins (1959) Heintzelman (1971) McCormick (1970) and N.J. Bureau of Wildlife Management

Table 1 (continued)

Animals (Status)	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS: Fresh Water Marsh	HABITATS: Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Deer Mouse (p) Peromyscus maniculatus	?	yes	-	x	-	-	-	-	-	x	x	x	-	
Marsh Rice Rat (u) Oryzomys palustris	south	yes	-	x	x	x	-	-	-	-	-	x	-	
Ermine (p) Mustela erminea	north	no	-	-	-	-	-	-	-	x	x	-	-	
Bobcat (p) Lynx rufus	north	no	-	-	-	-	-	x	-	x	-	-	-	
Black Bear (p) Ursus americanus	north	no	-	-	-	-	-	-	-	x	-	-	-	
Sperm Whale (e) Physeter catodon	coastal	yes	x	-	-	-	-	-	-	-	-	-	-	marine
Blue Whale (e) Sibbaldus musculus	coastal	yes	x	-	-	-	-	-	-	-	-	-	-	marine
Finback Whale (e) Balaenoptera physalus	coastal	yes	x	-	-	-	-	-	-	-	-	-	-	marine
Sei Whale (e) Balaenopters borealis	coastal	yes	x	-	-	-	-	-	-	-	-	-	-	marine

Sources: Applegate (1974) Collins (1959) Heintzelman (1971) McCormick (1970) and N.J. Bureau of Wildlife Management

Table 1 (continued)

Animals (status) Birds	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS Fresh Water Marsh	Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Sharp-Shinned Hawk (t) Accipiter striatus	state	yes	-	x	-	-	-	x	x	x	-	-	-	Rare breeder
Cooper's Hawk (e) Accipiter cooperii	state	yes	-	-	-	-	-	-	x	x	-	-	-	known nester
Red-Shouldered Hawk (t) Buteo lineatus	state	yes	-	-	-	-	-	x	x	x	-	-	-	Wet wood preferred
Bald Eagle (e) Haliaeetus leucocephalus	coastal	yes	x	x	x	-	-	-	-	x	-	-	-	near water eats fish
Marsh Hawk (t) Circus cyaneus	state	yes	-	x	x	x	-	-	-	-	x	x	-	coastal marshes grasslands, rare breeder
Osprey (e) Pandion nuliaetus	coastal	yes	x	x	x	x	-	-	-	-	-	-	-	near water eats fish
Peregrine Falcon (e) Falco peregrinus	state	yes	-	x	x	-	-	-	-	-	-	-	x	once nested in Palisades
Merlin (Pigeon Hawk) (t) Falco columbarius	coastal	yes	-	x	x	x	-	-	x	-	x	-	-	no current nests coastal imigrant
Turkey (p) Melegris gallopavo	north	no	-	-	-	-	-	-	-	x	-	-	-	Sussex County
Least Bittern (t) Ixobrychus exilis	state	yes	x	-	-	x	-	-	-	-	-	-	-	wading bird
Yellow-Crowned Night Heron (t) Nyctanassa violacea	coastal	yes	x	x	x	x	-	-	-	-	-	-	-	Wading bird breeds on barrier islands
King Rail (t) Rallus elegans	state	yes	x	-	x	x	-	-	-	-	-	-	-	mostly fresh water

Sources: Applegate (1974) Collins (1959) Heintzelman (1970 & 1971) McCormick (1970), Mr. Richard Kane, Mr. Richard Ryan, and N.J. Bureau of Wildlife Mgt.

Table 1 (continued)

Animals (status)	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS: Fresh Water Marsh	HABITATS: Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agriculture Fields	Meadow Grass-lands	Urban	Remarks
Yellow Rail (u) Coturnicops noveboracenis	state	yes	x	-	x	x	-	-	-	-	x	x	-	mostly coastal, very rare
Black Rail (t) Laterallus jamaicensus	coastal	yes	x	-	x	-	-	-	-	-	-	-	-	South coast, Delaware Bayshore
Piping Plover (t) Charadrius melodus	coastal	yes	x	x	-	-	-	-	-	-	-	-	-	
Upland Plover (t) Bartramia americana	state	yes	-	-	-	-	-	-	-	-	x	x	-	and airport margins
Roseate Tern (t) Sterna dougallii	coastal	yes	x	x	-	-	-	-	-	-	-	-	-	no known breeders
Barred Owl (t) Strix varia	state	yes	-	-	-	-	x	x	-	x	x	-	-	swamp forest preferred
Long-Eared Owl (u) Asio otus	state	yes	-	-	-	-	-	-	x	x	-	-	x	winters near garbage dumps
Short-Eared Owl (t) Asio flammeus	state	yes	-	x	x	x	-	-	-	-	x	x	-	open country, mostly coastal
Red-Headed Woodpecker (t) Melanerpes erythrocephalus	state	yes	-	x	-	-	-	-	x	x	x	-	-	local breeder
Short-Billed Marsh Wren (t) Cistothorus platensis	coastal	yes	-	x	x	x	-	-	-	-	-	x	-	sedge habitat, rare, local

Sources: Applegate (1974) Collins (1959) Heintzelman (1970) McCormick (1970), Mr. Richard Kane, Mr. Richard Ryan, and N.J. Bureau of Wildlife Management

Table 1 (continued)

Animals (status)	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS: Fresh Water Marsh	Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Bobolink (t) Dolichonyx oryzivorus	north	yes	-	-	-	x	-	-	-	-	x	x	-	
Orchard Oriole (u) Icterus spurius	state	yes	-	-	-	-	-	-	x	x	x	-	-	Along Route 9 Cape May - Ocean Co.
Ipswich Sparrow (t) Passerculus princeps	coastal	yes	-	x	-	-	-	-	-	-	-	-	-	winters on coastal dunes
Henslow's Sparrow (t) PasserHerbulus henslowii	state	yes	-	-	-	x	-	-	-	-	x	x	-	Old fields, sedges
Grasshopper Sparrow (t) Ammodraimus savannarum	state	yes	-	x	-	-	-	-	-	-	x	x	-	Old fields along coast, Cape May Brigantine
Vesper Sparrow (t) Poaecets gramineus	state	yes	-	x	-	-	-	-	-	-	x	x	-	in migration

Sources: Applegate (1974) Collins (1959) Heintzelman (1971) McCormick (1970), Mr. Richard Kane, Mr. Richard Ryan and N.J. Bureau of Wildlife Management

Table 1 (continued)

Animals (status)	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS: Fresh Water Marsh	Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Amphibians														
Jefferson Salamander (u) Ambystoma jeffersonianum	north	no	-	-	-	-	-	x	-	x	-	-	-	
Blue-Spotted Salamander (e) Ambystoma laterale	north	no	-	-	-	-	-	x	-	x	-	-	-	
Silvery Salamander (u) Ambystoma platineum	north	no	-	-	-	-	-	x	-	x	-	-	-	
Eastern Tiger Salamander (e) Ambystoma tigrinum	south	yes	-	-	-	x	-	x	x	x	-	-	-	Pine Barrens Gravel pits
Mountain Salamander (u) Desmognatus ochrophaeus	north	no	-	-	-	-	-	x	-	x	-	-	-	Damp woods
Eastern Mud Salamander (u) Pseudotriton montanus	south	yes	x	-	-	-	-	x	x	x	-	-	-	Pine Barrens, springs
Pine Barrens Treefrog (t) Hyla andersoni	south	yes	x	-	-	-	x	x	x	-	-	-	-	Pine Barrens white-cedar swamps
Gray Treefrog (u) Hyla versicolor (northern)	state	yes	x	-	-	x	x	x	x	x	x	-	-	very similar Cape May, Toms Rive North, New Jersey Cape May, Cumber-land counties.
Hyla chrysoscelis (southern)	south	yes	x	-	-	x	x	x	x	x	x	-	-	
New Jersey chorus Frog (u) Pseudacris triseriata kalmi	south	yes	x	-	-	x	x	-	x	-	-	-	-	subspecies
Upland Choruis Frog (u) Pseudacris triseriata fercarum	north	no	x	-	-	x	x	-	-	x	-	-	-	
Carpenter Frog (u) Rana virgatipes	south	yes	x	-	-	-	x	x	x	-	x	-	-	Pine Barrens white-cedar swamps

Sources: Applegate (1974)
Collins (1959) Heintzelman (1971) McCormick (1970) and N. J. Bureau of Wildlife Management

Table 1 (continued)

Animals (status)		Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS Fresh Water Marsh	Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Reptiles															
Bog Turtle Clemmys muhlenbergi	(e)	State	Yes	X	-	-	-	X	-	-	-	-	X	-	Pine Barrens, sphagnum bogs, marshy meadows.
Wood Turtle Clemmys insculpta	(u)	State	Yes	X	-	-	X	X	X	-	X	-	-	-	
Red-bellied Turtle Chrysenys rubriventris	(u)	State	Yes	X	-	-	-	X	X	X	-	-	-	-	
Atlantic Leatherback Dermochelys coviacea	(e)	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Marine
Atlantic Green Turtle Chelonia mydas	(e)	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Marine
Atlantic Loggerhead Caretta caretta	(p)	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Marine
Atlantic Hawksbill Eretmochelys imbricata	(e)	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Marine
Atlantic Ridley Lepidochelys kempi	(e)	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Marine

Sources: Applegate (1974) Collins (1959) Heintzelman (1971) McCormick (1970) and N.J. Bureau of Wildlife Management

Table 1 (continued)

Animals (status)	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS: Fresh Water Marsh	HABITATS: Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Ground Skink (p) Leiolopisma laterale	south	yes	-	-	-	-	-	x	x	x	-	-	-	Pine Barrens
Five-line Skink (u) Eumeces fasciatus	state	yes	-	-	-	-	-	x	x	x	-	-	-	Pine Barrens rotten logs
Eastern Earth Snake (t) Virginia valeriae	south	yes	-	-	-	-	-	-	x	x	x	x	-	
Corn Snake (u) Elaphe guttata	state	yes	-	-	-	-	-	-	x	x	x	x	x	roadsides
Northern Pine Snake (u) Pituophis melanoleucus	south	yes	-	-	-	-	-	x	x	-	-	-	-	
Northern Scarlet Snake (u) Cemophora coccinea	south	yes	-	-	-	-	-	x	x	x	-	-	-	underground, sandy or mucky soils
Timber Rattlesnake (t) Crotalus horridus	state	yes	-	-	-	-	-	x	x	x	-	-	-	

Sources: Applegate (1974) Collins (1959) Heintzelman (1971) McCormick (1970) and N.J. Bureau of Wildlife Management

Table 1 (continued)

Animals (status)	Range in N.J.	Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	HABITATS: Fresh Water Marsh	HABITATS: Bog	Lowland Swamp Forest	Pine Forest	Hard-Wood Forest	Agricul-ture Fields	Meadow Grass-lands	Urban	Remarks
Fishes														
Shortnose Sturgeon (e) Acipensor brevirostrus	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Anadromous
Atlantic Tomcod (t) Microgradus tomcod	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Anadromous
Rainbow Smelt (p) Osmerus mordox	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Anadromous
American Shad (u) Alosa sapidissima	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Anadromous
Atlantic Sturgeon (u) Acipenser oxyrhynchus	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Anadromous
Slimy Sculpin (u) Cottus cognatus	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Freshwater species
Spotfin Killfish (u) Fundulus luciae	Coastal	Yes	X	-	-	-	-	-	-	-	-	-	-	Also called Lucy's Killifish, esturine

Sources: Breeder (1948) Collins (1959) McCormick (1970) and N.J. Bureau of Wildlife Management

Table 3. Numbers of listed species present in major coastal zone communities.

Phylla	Number in Coastal Zone	Marine	Esturine and Barrier Beach	Freshwater Wetlands	Forests	Open Lands	Urban
Mammals	19	14	3	2	2	3	1
Birds	27	8	18	15	11	13	2
Reptiles	6	5	0	8	9	3	1
Amphibians	15	0	0	6	5	1	0
Fish	6	6	6	5	-	-	-
TOTAL	73	33	27	36	27	20	4

Totals do not add across because species are present in more than one community.

Table 2. Numbers of listed species supported by various coastal zone habitats.

Phylla	Number in Coastal Zone	Aquatic	Barrier Beach	Salt Marsh	Fresh Marsh	Bog	Lowland Swamp Forest	Pine Forest	Hardwood Forest	Agricultural Fields	Meadow Grass-lands	Urban
Mammals	19	14	2	1	1	1	1	0	2	1	3	1
Birds	27	9	15	11	11	1	3	7	9	12	9	2
Reptiles	15	8	0	0	1	3	7	8	7	2	3	1
Amphibians	6	5	0	0	3	4	5	5	2	1	0	0
Fish	6	6	-	0	0	0	-	-	-	-	-	-
TOTAL	73	42	17	12	16	9	16	20	20	16	15	4

*Totals do not add across because many species use more than one habitat.

Table 4. Some species whose populations were greatly reduced in the coastal zone before 1920 and their present status.

Species	Present Status
Timber wolf	extinct in N. J.
Black bear	recovering in north
White-tailed deer	recovered
Mountain lion	extinct in N. J.
Bobcat	recovering in north
Eskimo curlew	extinct as a species
Other sandpipers	most have recovered
Wood duck	recovered
Snowy egret	recovered
Heath hen (race of Prairie Chicken)	extinct as a race
Passenger Pigeon	extinct as a species
Diamond-backed terrapin	recovered
Atlantic salmon	extinct in N. J.

Table 5. Federal endangered or threatened species found in New Jersey.

Endangered

Shortnose sturgeon

Bald eagle

Peregrine falcon

Sperm whale

Blue whale

Finback whale

Sei whale

Humpback whale

Right whale

Threatened *

Bog turtle

Pine Barrens treefrog

Ipswich sparrow

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*Resource Publication 114, March 1973

TABLE B
MANAGEMENT TOOLS

Upland Living Resources: Endangered and Rare Wildlife

Title 23 of the New Jersey Statutes contains numerous laws regulating the capture and hunting of upland living resources. The broadest statute currently regulating such resources is the New Jersey Rare and Endangered Species Act NJSA 23:2A-1 et seq.

Under the mandates of this law the State must accord special protection, to maintain, and enhance species or subspecies of wildlife indigenous to the State.

The State must also assist in the protection of species which are deemed to be endangered elsewhere; by regulating the possession, transportation, exportation, sale, or offer for sale or shipment within this State of species of wildlife including those on any federal endangered species list.

The Director of the Division of Fish, Game and Shellfisheries within DEP is to conduct investigations on wildlife to develop information relating to populations, destribution, and habitat needs, to determine if management mechanisms will be necessary for the species to sustain themselves. An official listing of rare and endangered species has been proposed for adoption.

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APPENDIX C
REFERENCES

COASTAL ZONE
INFORMATION CENTER

NOAA COASTAL SERVICES CENTER LIBRARY
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