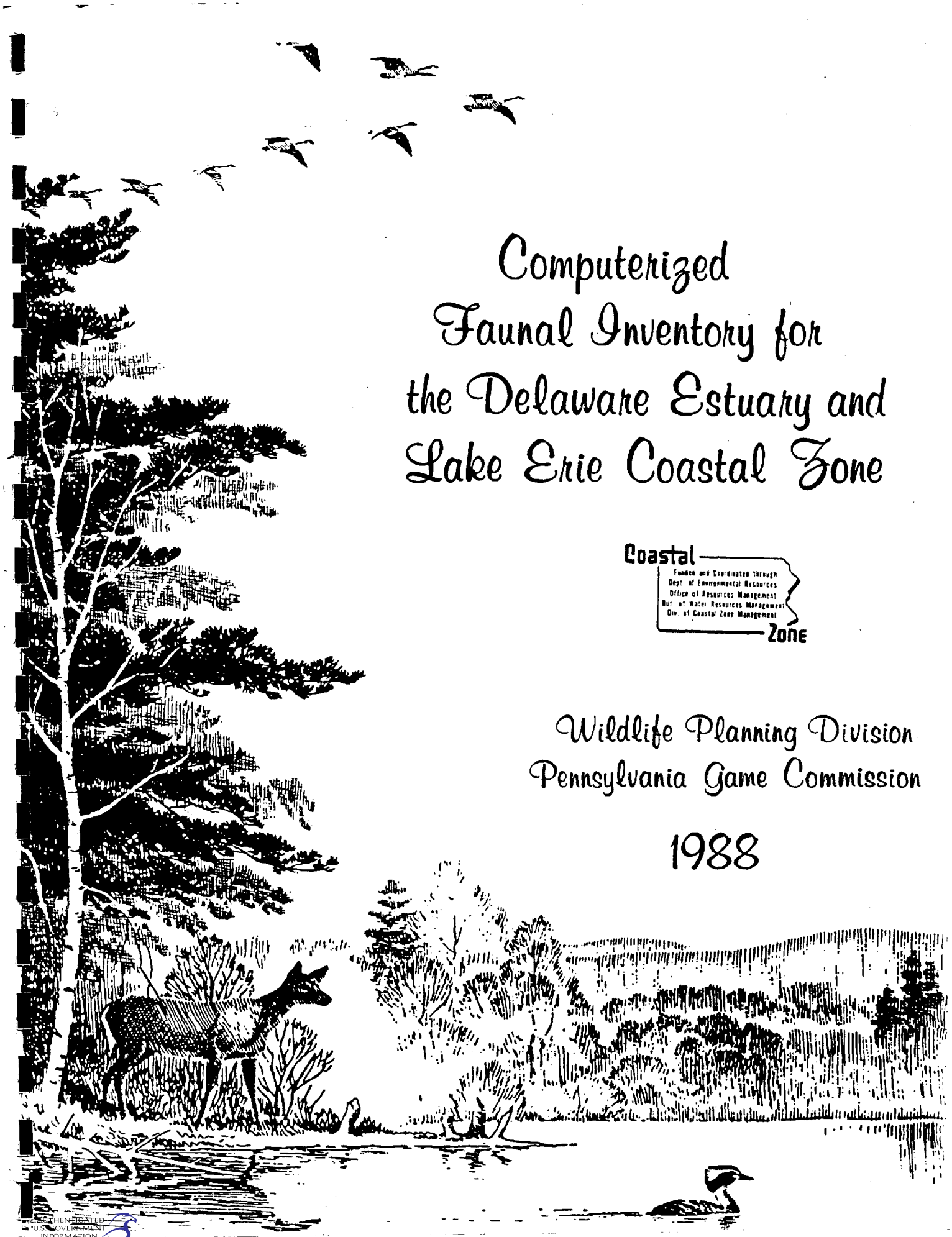

Computerized Faunal Inventory for the Delaware Estuary and Lake Erie Coastal Zone

Coastal Zone

Funded and Coordinated Through
Dept. of Environmental Resources
Office of Resources Management
Bur. of Water Resources Management
Div. of Coastal Zone Management

Wildlife Planning Division
Pennsylvania Game Commission

1988

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COMPUTERIZED FAUNAL INVENTORY FOR THE DELAWARE ESTUARY AND LAKE ERIE COASTAL ZONE

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Prepared by:

Division of Wildlife Planning
Bureau of Land Management
Pennsylvania Game Commission

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INTRODUCTION

One of the major limiting factors in the analysis of environmental projects is the availability of faunal inventory data for the project area. Ideally, the project manager should know which animal species are present within the project area (at all times of year, not just the present), how many (abundance) of each species are present, the habitats used by each species, and the responses likely elicited by the species (individuals and populations) due to habitat changes on the project site. Many times a plethora of faunal information already is available for a project area, but is widely dispersed in books, filing cabinets, field notebooks, and the minds of professional ecologists and research biologists. Computer technology has made it possible for biologists to summarize data from diffuse sources into an easily accessible database, with the ability subsequently to analyse complex environmental problems for faunal concerns in minutes rather than hours, days, and weeks.

In the early 1980's a group of research biologists with the U.S. Fish and Wildlife Service developed a computerized database of Pennsylvania's faunal resources for use in environmental planning. Management of this database -- the Pennsylvania Fish and Wildlife Data Base -- was transferred to the Pennsylvania Game Commission in 1982.

Data Base Contents

The Pennsylvania Fish and Wildlife Data Base contains complete profiles for 651 resident and common migrant and select invertebrate species occurring within Pennsylvania. The 651 species in the Data Base are represented by nine major animal groups, as follows: amphibians (39), reptiles (36), fishes (171), birds (293), mammals (70), and molluscs (42).

Each species profile in the Data Base was compiled using a standard format containing standard definitions and classifications. The definitions, classifications, and data collection format evolved out of an extensive survey of professional natural resource agencies, universities, and private conservation organizations.

Each species profile contains descriptors defining distribution in Pennsylvania, legal and use status, habitat associations, food habits, environmental associations and requirements, life history, and management practices. All of this information, compiled in the standard coding booklet, was summarized by professionals with sound research backgrounds and expert knowledge of the species or species group. Each species profile was developed from a combination of published reports and field notes, and also includes professional opinion. Each data base entry is fully referenced to the original source documents.

Data Base Management

At the present time two versions of the Pennsylvania Fish and Wildlife Data Base operate - one mainframe and one microcomputer. The mainframe version operates on the Univac computer at Bloomsburg University, Bloomsburg, Pennsylvania, using the MANAGE database management system. The microcomputer version - using Advanced Revelation software -

is being tested and manuals developed for distribution in early 1989. Transition to dedicated micromputer use is expected by October, 1989. Presently, interactive access or batch processing on the mainframe version is possible via telephone with compatible computer hardware.

Data Base Availability

The Pennsylvania Fish and Wildlife Data Base is available to federal and state agencies, universities, conservation organizations, environmental organizations, environmental and engineering consulting firms, and any individual needing fish and wildlife information. Two modes of access are possible; direct interactive access, and over-the-counter service through the Game Commission.

Interactive access is available only to public agencies. All other prospective users must request information through the Game Commission's Data Base Coordinator.

Users of the Data Base have included the U.S. Bureau of Land Management (Eastern States Office), U.S. Office of Surface Mining (Eastern Technical Center), U.S. Army Corps of Engineers (Baltimore, Philadelphia, and Pittsburgh District Offices), U.S. Forest Service (Allegheny National Forest, Northeastern State and Private Forestry, and the Northeastern Forest Experiment Station), U.S. Nuclear Regulatory Commission, U.S. Soil Conservation Service, U.S. Fish and Wildlife Service, Pennsylvania Fish Commission, Pennsylvania Department of Environmental Resources, (Bureau of Water Quality Management, Water Resources Management, Dams and Waterways Management, Information Systems, and Forestry), and numerous environmental/engineering consulting firms.

Applications

Each species profile in the Data Base is divided into 125 separate datafields (e.g., species common-name, or occurrence within a watershed). Literally thousands of combinations, i.e., questions, are answerable given this type of data organization.

The Pennsylvania Fish and Wildlife Data Base will give almost instantaneous answers to questions like the following:

- *What fish and wildlife species are found in Erie County?*
- *What birds and mammals are found in riparian habitats of the Chatauqua-Conneaut drainage of eastern Lake Erie?*
- *What species occurring in the Chatauqua-Conneaut drainage would be adversely affected (or benefited) by channelizing and/or impounding water?*
- *What vertebrate wildlife species in Bucks County require cavities in snags for nesting?*
- *What endangered or threatened species occur in estuarine habitats in Delaware County and what types of activities would adversely affect their survival?*

- *What are the habitat requirements and limiting factors of the federally endangered piping plover?*

Specific applications already noted by Data Base users include:

1. Basic descriptions of individual species, their habitat associations, and life histories.

2. Preparation and review of permit applications for surface mining, power plant siting, point source discharge, solid waste and hazardous waste disposal, and wetland encroachments.

3. Analysis of proposals to designate species water quality classifications for waterways.

4. Evaluation and review of energy development project sites, flood control projects, road construction and improvement projects, bridge replacements, and fly ash disposal sites.

5. Preparation and review of environmental assessments and impact statements (fish and wildlife section).

6. Preparation of wildlife research proposals.

7. Guilding species for habitat evaluation procedures and the construction of species models.

8. Analysis of habitat specific wildlife trends in Pennsylvania.

9. Information source for biological technical training and public information requests.

Updating

The Pennsylvania Fish and Wildlife Data Base, like any other data source, remains valuable only as long as the information obtained is current and meets the expressed needs of the end-user. Information must be updated periodically, incorporating new research findings and new information elements required by users to maintain value and integrity. Through an extensive review of the present Data Base elements and capabilities with Data Base users, several new elements or categories of information (e.g., life history - behavior, reproduction, population dynamics, and limiting factors) and new element values had been identified for inclusion in the Data Base. Additionally, evaluators emphasized the need to review and incorporate new information on species distribution and life history reported in ecological publications.

PROJECT OBJECTIVE

The objective of this research was to update select coastal zone dwelling species in the Pennsylvania Fish and Wildlife Data Base by summarizing the best available information and adding it to existing and new data categories in the Data Base; that is, by compiling data on animal species seasonal distribution, forest-habitat relationships, environmental associations and preferences, food habits, life history, HEP/PAM-HEP model

data, and additional management practices and effects. This effort consisted of a comprehensive survey of existing literature and records, without further field investigation, i.e., a summary of our state-of-knowledge. This information was entered into the Data Base and stored in key-word searchable fashion to facilitate data retrieval and analysis.

Updated faunal data stored and retrieved in the Data Base from this project may be readily obtained to advance Coastal Zone Management program goals requiring the consideration of wildlife resources, including port projects in lakefront areas, public access projects along the coastal zone, coastal zone comprehensive plan updates, and educational programs informing the public of the value of coastal zone areas.

METHODS

Species to be updated were identified by geographic location (Erie and Delaware Estuary Coastal Zone Areas), and habitats (e.g., lacustrine littoral systems with cobble/gravel beaches) occurring within the areas. Emphasis was placed on species that breed, over-winter, and use adjacent habitats for a significant purpose. The 132 species selected for the project are identified in Figures 1 through 6.

Figure 1. Birds included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Common Name	Scientific Name
Blackbird, red-winged	Agelaius phoeniceus
Blackbird, rusty	Euphagus carolinus
Brant	Branta bernicula
Canvasback	Aythya valisineria
Cardinal, northern	Cardinalis cardinalis
Catbird, gray	Dumetella carolinensis
Crow, fish	Corvus ossifragus
Dove, mourning	Zenaide macroura
Duck, ruddy	Oxyura jamaicensis
Duck, wood	Aix sponsa
Egret, cattle	Bubulcus ibis
Egret, great	Casherodius albus
Egret, snowy	Leucophoyx thula
Flycatcher, willow	Empidonax traillii
Gnatcatcher, blue-gray	Polioptila caerulea
Goose, Canada	Branta canadensis
Goose, snow	Chen hyperborea
Grackle, common	Quiscalus quiscula
Grebe, horned	Podiceps auritus
Grebe, pied-billed	Podilymbus podiceps
Grebe, red-necked	Podiceps grisegena
Heron, black-crowned night	Nycticorax nycticorax
Heron, green-backed	Butorides virescens
Heron, yellow-crowned night	Nyctanassa violacea
Ibis, glossy	Plegadis falcinellus
Killdeer	Charadrius vociferus
Kingbird, eastern	Tyrannus tyrannus
Loon, common	Gavia immer
Mallard	Anas platyrhynchos
Merganser, common	Mergus merganser
Merganser, hooded	Mergus cucullatus
Moorhen, common gallinule	Gallinula chloropus
Oldsquaw	Clangula hyemalis
Owl, snowy	Nyctea scandiaca
Phalarope, Wilson's	Phalaropus tricolor
Pipit, water	Anthus spinoletta
Plover, black-bellied	Pluvialis squatarola
Plover, semi-palmated	Charadrius semipalmatus
Rail, king	Rallus elegans
Rail, Virginia	Rallus limicola
Rail, yellow	Coturnicops noveboracensis
Sandpiper, buff-breasted	Tryngites subruficallis
Sandpiper, least	Calidris minutilla
Sandpiper, pectoral	Calidris melanotos
Sandpiper, solitary	Tringa solitaria
Sandpiper, spotted	Actitis macularia
Scaup, greater	Aythya marila
Scaup, lesser	Aythya affinis
Scoter, white-winged	Millanita fusca
Shoveler, northern	Anas clypeata

Sora	*Porzana carolina*
Sparrow, Savannah	*Passerculus sandwichensis*
Sparrow, swamp	*Melospiza georgiana*
Swallow, barn	*Hirundo rustica*
Swallow, cliff	*Petrochelidon pyrrhonota*
Swan, tundra	*Olor columbianus*
Swan, mute	*Cyonus olor*
Teal, blue-winged	*Anas discors*
Teal, green-winged	*Anas crecca*
Tern, black	*Chlidonias niger*
Tern, caspian	*Sterna caspia*
Tern, least	*Sterna albifrons*
Turnstone, ruddy	*Arenaria interpres*
Vireo, white-eyed	*Vireo griseus*
Warbler, prothonotary	*Protonotaria citrea*
Widgeon, American	*Anas americana*
Widgeon, Eurasian	*Anas penelope*
Wren, sedge	*Cistothorus platensis*

Figure 2. Mammals included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Common Name	*Scientific Name*
Bat, big brown	*Eptesicus fuscus*
Chipmunk	*Tamias striatus*
Cottontail, eastern	*Sylvilagus floridanus*
Fox, gray	*Urocyon cinereoargenteus*
Fox, red	*Vulpes vulpes*
Mole, eastern	*Scalopus aquaticus*
Mouse, house	*Mus muscalus*
Mouse, white-footed	*Peromyscus leucopus*
Rat, Norway	*Rattus norvegicus*
Skunk, striped	*Memphitis mephitis*
Squirrel, gray	*Sciurus carolinensis*
Vole, pine woodland	*Microtus pinetorum*

Figure 3. Amphibians included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Common Name	*Scientific Name*
Frog, bull	*Rana catesbeiana*
Frog, New Jersey chorus	*Pseudacris triseriata kalmi*
Frog, northern cricket	*Acris c. crepitans*
Hellbender, eastern	*Cryptobranchus a. alleganiensis*
Mudpuppy	*Necturus m. maculosus*
Peeper, northern spring	*Hyla c. crucifer*
Salamander, longtail	*Eurycea l. longicauda*

Figure 4. Fishes included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
Bass, rock	*Ambloplites rupestris*
Bass, smallmouth	*Micropterus dolomieui*
Bass, striped	*Morone saxatilis*
Bass, white	*Morone chrysops*
Bluegill	*Lepomis macrochirus*
Bullhead, brown	*Ictalurus nebulosus*
Bullhead, yellow	*Ictalurus natalis*
Carp, common	*Cyprinus carpio*
Catfish, channel	*Italurus punctatus*
Catfish, white	*Ictalurus catus*
Chub, hornyhead	*Nocomis biquttatus*
Chub, silver	*Hybopis storeriana*
Chubsucker, creek	*Erimyzon oblongus*
Crappie, black	*Pomoxis nigromaculatus*
Dace, blacknose	*Rhinichthys atratulus*
Dace, longnose	*Rhinichthys cataractae*
Darter, channel	*Percina copelandi*
Darter, tessellated	*Estheostoma olmstedi*
Madtom, margined	*Noturus insignis*
Minnow, silvery	*Hybognathus nuchalis*
Minnow, bluntnose	*Pimephales notatus*
Minnow, fathead	*Pimephales promelas*
Mummichog	*Fundulus heteroclitus*
Perch, white	*Morone americana*
Pickerel, chain	*Esox niger*
Pickerel, redfin	*Esox americanus americanus*
Pike, blue	*Stizostedion vitreum glaucum*
Redhorse, golden	*Moxostoma erythrurum*
Redhorse, shorthead	*Moxostoma macrolepidotum*
Salmon, chinook	*Oncorhynchus tshawytscha*
Salmon, coho	*Oncorhynchus kisutch*
Shad, American	*Alosa sapidissima*
Shiner, emerald	*Notropis atherinoides*
Shiner, common	*Notropis cornutus*
Shiner, mimic	*Notropis volucellus*
Shiner, redfin	*Notropis umbratilis*
Shiner, rosyface	*Notropis rubellus*
Shiner, spotfin	*Notropis spilopterus*
Shiner, spottail	*Notropis hudsonius*
Shiner, swallowtail	*Notropis procne*
Stickleback, fourspine	*Apeltes quadracus*
Stickleback, threespine	*Gasterosteus aculeatus*
Stonecat	*Noturus flavus*

Figure 4. Fishes included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Sturgeon, lake	*Acipenser fulvescens*
Sucker, northern hog	*Hypentelium nigricans*
Sunfish, banded	*Enneacanthus obesus*
Sunfish, blue-spotted	*Enneacanthus gloriosus*
Sunfish, green	*Lepomis cyanellus*
Sunfish, redbreast	*Lepomis auritus*
Walleye	*Stizostedion v. vitreum*
Warmouth	*Lepomis gulosus*
Whitefish, lake	*Coregonus clupeaformis*

Figure 5. Reptiles included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Common Name	*Scientific Name*
Snake, eastern ribbon	*Thamnophis s. sauritus*
Snake, shorthead garter	*Thamnophis brachystoma*
Turtle, wood	*Clemmys insculpta*

Figure 6. Molluscs included in the computerized faunal inventory for the Lake Erie and Delaware Estuary Coastal Zones.

Common Name	*Scientific Name*
Pigtoe, round	*Pleurobema sintoxia*
Pocketbook, tidewater	*Leptodea ochracea*
Shell, Fisher's purple	*Elliptio fisheriana*
Shell, northern lamp	*Pleurobema clava*
Shell, painted riffle	*Epioblasma triquetra*
	Campeloma decisum
	Helisoma trivolvis
	Physa heterostropha

Figure 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

FIELDNAME	DESCRIPTION
T.FPART	TRANSLATION OF THE FPART CODE FIELD
ENVIRON.ASSOC	MERGED ENVIRONMENTAL ASSOCIATIONS XLATES.
T.QUAD.CODE	TRANSLATION ELEMENT FOR THE QUAD.CODE ELEMENT.
T.NWIMOD	TRANSLATION FOR THE NWIMOD CODE FIELD
T.LAND.USE	TRANSLATION FOR THE LAND.USE CODE FIELD
FOOD.HABITS	MERGED FOOD HABITS
RETURN.SPECIES.	SYMBOLIC FIELD THAT HOLDS DEFAULT SPECIES ID.
T.ECOREGION	TRANSLATION FOR THE ECOREGION CODE FIELD
T.STATUS	TRANSLATION OF THE STATUS CODE FIELD
T.UNK.COUNTY	TRANSLATION ELEMENT FOR THE UNK.COUNTY FIELD.
DEFAULT.SPECIES	SYMBOLIC ELEMENT THAT HELPS TRANSFER A SPECIES ID FROM SCREEN TO SCREEN.
T.ELIFESTAGE	TRANSLATION OF THE ELIFESTAGE CODE FIELD.
T.REFERENCE	SYMBOLIC ELEMENT THAT PULLS PART OF THE CITATION UP FROM THE MASTREF FILE.
T.ABS.COUNTY	TRANSLATION FIELD FOR THE ABS.COUNTY FIELD.
T.PHYS	TRANSLATION FOR THE PHYS CODE FIELD
T.MGT	TRANSLATION FOR THE MGT CODE FIELD
WETLANDS	MERGED NWI XLATES.
T.NAME	TRANSLATION TO DISPLAY THE COMMON NAME OF THE SPECIES REQUESTED.
SAF	MERGED SAF.TYPE XLATES.
@CRT	
T.ABUND.CTY	TRANSLATION FIELD FOR THE ABUND.CTY
T.FOOD	TRANSLATION OF THE FOOD CODE FIELD
T.NWISPEC	TRANSLATION FOR THE NWISPEC CODE FIELD
T.OCCUR.COUNTY	TRANSLATION FIELD FOR THE OCCUR.COUNTY ELEMENT.

Figure. 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

FIELDNAME	DESCRIPTION
DISTRIB	MERGED FOOD HABITS
T.SAF.TYPE	TRANSLATION FOR THE SAF.TYPE CODE FIELD
T.PNV	TRANSLATION FOR THE PNV CODE FIELD.
T.CAT	TRANSLATION FOR THE CODED FIELD CATEGORY.
T.NWI	TRANSLATION FOR THE NWI CODE FIELD
ALL.REFS	THE FULL CITATIONS FOR ALL REFERENCES USED IN A SPECIES BOOKLET.
T.STAGE	TRANSLATION OF THE SAF STAGE CODE FIELD
T.CLOS	TRANSLATION OF THE SAF CLOS CODE FIELD
T.HYDRO.CODE	TRANSLATION ELEMENT FOR THE T.HYDRO.CODE ELEMENT.
T.SEAS.OCCUR	TRANSLATION ELEMENT FOR THE T.SEAS.OCCUR FIELD.
T.MGT.FIELD	TRANSLATION OF THE MGT.FIELD CODE FIELD
T.FSIZE	TRANSLATION FOR THE FSIZE CODE FIELD.
MANAGEMENT	THE MANAGEMENT PRACTICES SHUFFLED TRANSLATIONS.
T.FLIFESTAGE	TRANSLATION OF THE FLIFESTAGE CODE FIELD.
T.ENVIRON	TRANSLATION OF THE ENVIRON CODE FIELD.
T.NWICLS	TRANSLATION FO THE ENVIRON CODE FIELD.
SPECIES.ID	SPECIES IDENTIFICATION KEY
CAT	THE CATEGORY CODE FROM THE BOVA SPECIES LIST.
NAME	THE COMMON NAME OF THE SPECIES AS LISTED BY THE APPROPRIATE REFERENCE AND THE BOVA SPECIES RECORD.
PHYLUM	THE NAME OF THE PHYLUM THE SPECIES IS IN WHICH THE SPECIES HAS BEEN CATEGORIZED.
SUBPHYLUM	THE SUBPHYLUM FOR A GIVEN SPECIES.
CLASS	THE CLASS DESIGNATION FOR THE SPECIES.
SUBCLASS	SUBCLASS OF SPECIES.
ORDER	ORDER OF SPECIES.

Figure 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

FIELDNAME	DESCRIPTION
SUBORDER	SUBORDER OF SPECIES.
FAMILY	FAMILY OF SPECIES.
SUBFAMILY	SUBFAMILY OF SPECIES.
GENUS	GENUS OF SPECIES.
SUBGENUS	THE SUBGENUS OF SPECIES.
SPECIES	SELF-EXPLANATORY
SSP	SUB-SPECIES
AUTHORITY	TAXONOMIC AUTHORITY FOR THE SPECIES TAXONOMIC CATEGORIZATION.
R.TAXONOMY	THE REFERENCE(S) USED TO COMPLETE THE FIELDS DESCRIBING THE TAXONOMY OF THE SPECIES.
C.TAXONOMY	COMMENTS CONCERNING THE TAXONOMIC DESCRIPTION
STATUS	THE STATUS CODES WHICH DESCRIBE THE LEGAL, ECONOMIC, OR ECOLOGICAL STATUS OF THE SPECIES IN THE COMMONWEALTH.
R.STATUS	THE REFERENCES USED TO COMPLETE THE STATUS INFORMATION FOR THE SPECIES.
C.STATUS	COMMENTS REFERRING TO THE STATUS.
OCCUR.COUNTY	A LIST OF FIPS CODE FOR COUNTIES WHERE SPECIES OCCUR.
ABS.COUNTY	A LIST OF FIPS CODES FOR COUNTIES WHERE SPECIES IS KNOWN TO BE ABSENT.
UNK.COUNTY	A LIST OF FIPS CODES FOR COUNTIES WHERE THE SPECIES IS UNKNOWN TO OCCUR.
SEAS.OCCUR	SEASONAL OCCURRENCE CODES IN DISTRIBUTION SECTION.
ABUND.CTY	COUNTY ABUNDANCE CODES IN RELATION TO SEASONAL OCCURRENCE.
HYDRO.CODE	OWDC HYDROLOGIC UNIT CODES IN RELATION TO SEASONAL OCCURRENCE.
QUAD.CODE	7.5' QUADRANGLE OCCURRENCE.
LATLONG	LATITUDE/LONGITUDE POINT FOR HIGH VALUE SPECIES DISTRIBUTION.

Figure 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

Fieldname	Description
R.HABITAT	REFERENCED USED TO DOCUMENT THE HABITAT FIELD.
RIPARIAN	DESIGNATE THE SPECIES AS OCCURRING IN RIPARIAN HABITATS.
R.RIPARIAN	RIPARIAN REFERENCES.
FSIZE	FOREST SIZE CLASS.
R.FSIZE	FOREST SIZE REFERENCES.
SAF.TYPE	SAF FOREST COVER TYPES (WITH VARIANTS).
STAGE	THE STAGE MODIFIER FOR SAF FOREST COVER TYPE.
CLOS	CANOPY CLOSURE.
R.SAF.TYPE	REFERENCES FOR SAF FOREST COVER TYPES.
LAND.USE	LANDUSE/LANDCOVER CLASSIFICATION THAT SPECIES IS ASSOCIATED WITH.
R.LAND.USE	LAND USE REFERENCES.
NWI	SYSTEM/SUBSYSTEM INFORMATION THAT THE SPECIES IS KNOWN TO BE ASSOCIATED WITH.
NWICLS	CLASS/SUBCLASS INFORMATION MODIFYING THE NWI FIELD.
R.NWI	THE REFERENCES USE TO DOCUMENT THE INFORMAITON IN THE NWI FIELD.
C.HAB.ASSOC	COMMENTS REGARDING SPECIES HABITAT.
ANIMAL.PLANT	LIST OF SYMBIOTIC AND OTHER PLANT/ANIMAL ASSOC.
R.ANIMAL.PLANT	ANIMAL/PLANT REFERENCES.
C.ANIMAL.PLANT	COMMENTS ON ANIMAL/PLANT RELATIONSHIPS.
HAB.INTERRELN	INFORMATION ASSOCIATING SPECIES WITH HABITAT, SEASON, FUNCTION, RELATIVE VALUE, AND OTHER FEATURES.
R.HAB.INTERRELN	REFERENCES FOR HABITAT INTERRELATIONSHIP.
HIGH.HABITAT	HIGH HABITATS REQUIRED FOR COMPLETION OF SPECIES LIFE CYCLE.
R.HIGH.HABITAT	HIGH HABITAT REFERENCES.
C.HIGH.HABITAT	COMMENTS REGARDING HIGH HABITAT INFORMATION.

Figure 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

Fieldname	DESCRIPTION
HEP	Information for calculating habitat suitability indices (HSI) using habitat evaluation.
HSI	Information for calculating habitat suitability indices using habitat evaluation.
R.HEP	REFERENCES USED TO DOCUMENT THE INFORMATION IN THE HEP FIELD.
C.HEP	COMMENTS ON HEP INFORMATION.
TROPHIC	TROPHIC LEVEL THAT BEST DESCRIBES GENERAL FOOD HABITS OF SPECIES.
R.TROPHIC	REFERENCES USED TO DOCUMENT THE INFORMATION IN THE TROPHIC FIELD.
F.LIFESTAGE	LIFESTAGE FOR FOOD HABITS.
FOOD	THE SPECIFIC FOOD ITEM CONSUMED BY SPECIES.
FPART	THE SPECIFIC PART OF OF FOOD ITEM CONSUMED BY SPECIES.
R.FOOD.G	REFERENCES USED TO DOCUMENT THE INFORMATION FOR THE GENERAL FOOD HABITS OF THE SPECIES.
R.FOOD.I	REFERENCES USED TO DOCUMENT THE INFORMATION IN THE IMPORTANT FOOD HABITATS OF THE SPECIES.
C.FOOD	COMMENTS FOR THE GENERAL AND IMPORTANT FOOD HABITS OF SPECIES.
R.FOOD.L	REFERENCES USED TO DOCUMENT THE INFORMATION IN THE LARVAL FOOD HABITATS OF THE SPECIES.
C.FOOD.L	COMMENTS REGARDING THE LARVAL FOOD HABITATS OF THE SPECIES.
R.FOOD.J	REFERENCES USED TO DOCUMENT THE JUVENILE FOOD HABITATS OF THE SPECIES.
C.FOOD.J	COMMENTS ON THE JUVENILE FOOD HABITATS OF THE SPECIES.
R.FOOD.A	REFERENCES USED TO DOCUMENT THE ADULT FOOD HABITATS OF THE SPECIES.
C.FOOD.A	COMMENTS REGARDING THE ADULT FOOD HABITATS OF THE SPECIES.
ELIFESTAGE	THE LIFESTAGE FOR THE SPECIFIC ENVIRONMENTAL ASSOCIATIONS OF THE SPECIES.

Figure 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

FIELDNAME	DESCRIPTION
ENVIRON	THE SPECIFIC ENVIRONMENTAL ASSOCIATIONS OF THE SPECIES LIFE STAGE.
R.ENVIRON	THE REFERENCE(S) USED TO CITE THE FIELDS DESCRIBING THE GENERAL ENVIRONMENTAL ASSOCIATIONS OF THE SPECIES.
R.ENVIRON.LIM	REFERENCES USED TO DOCUMENT THE INFORMATION IN THE LIMITING ENVIRONMENTAL ASSOCIATIONS.
C.ENVIRON	COMMENTS ON THE GENERAL AND LIMITING ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.E	REFERENCES USED TO DOCUMENT THE ENVIRONMENTAL ASSOCIATIONS OF THE EGG LIFESTAGE.
R.ENVIRON.FL	REFERENCES FOR THE FEEDING LARVA ENVIRONMENTAL ASSOCIATIONS.
C.ENVIRON.FL	COMMENTS ON FEEDING LARVA ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.RL	REFERENCES FOR RESTING LARVA ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.P	REFERENCES FOR PUPA ENVIRONMENTAL ASSOCIATIONS.
C.ENVIRON.P	COMMENTS ON PUPA ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.FJ	REFERENCES FOR FEEDING JUVENILE ENVIRONMENTAL ASSOCIATIONS.
C.ENVIRON.FJ	COMMENTS ON FEEDING JUVENILE ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.RJ	REFERENCES FOR RESTING JUVENILE ENVIRONMENTAL ASSOCIATIONS.
C.ENVIRON.RJ	COMMENTS ON RESTING JUVENILE ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.FA	REFERENCES FOR FEEDING ADULT ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.RA	REFERENCES FOR RESTING ADULT ENVIRONMENTAL ASSOCIATIONS.
C.ENVIRON.RA	COMMENTS ON RESTING ADULT ENVIRONMENTAL ASSOCIATIONS.
R.ENVIRON.BA	REFERENCES FOR BREEDING ADULT ENVIRONMENTAL ASSOCIATIONS.

Figure 7. Fieldnames and definitions of data categories defined in the Pennsylvania Fish and Wildlife Data Base.

FIELDNAME	DESCRIPTION
C.ENVIRON.BA	COMMENTS ON BREEDING ADULT ENVIRONMENTAL ASSOCIATIONS.
LIFE.HIST	TEXT FIELD FOR LIFE HISTORY INFORMATION.
R.LIFE.HIST	REFERENCES USED TO DOCUMENT THE INFORMATION FOR THE LIFE HISTORY FIELD.
C.LIFE.HIST	COMMENTS ON LIFE HISTORY.
MGT.FIELD	INDICATES RELATIONSHIP OF THE MANAGEMENT PRACTICE TO THE SPECIES (BENEFICIAL, ADVERSE, OR EXISTING).
MGT	SPECIFIC MANAGEMENT PRACTICE.
R.MGT.B	REFERENCES FOR DOCUMENTATION OF THE BENEFICIAL MANAGEMENT PRACTICES.
R.MGT.A	REFERENCES USED TO DOCUMENT THE INFORMATION IN THE ADVERSE MANAGEMENT PRACTICES.
R.MGT.E	REFERENCES TO DOCUMENT THE EXISTING MANAGEMENT PRACTICES.
C.MGT	COMMENTS FOR THE MANAGEMENT OF THE SPECIES.
REFERENCES	REFERENCES USED TO DOCUMENT THE INFORMATION FOR THE SPECIES.
LIFE.HIST.C	COMMENTS ON THE LIFE HISTORY SECTION.
COM.NAME	SPECIES COMMON NAME.
SCI-NAME	SPECIES SCIENTIFIC NAME.
RES.STATUS	SPECIES YEAR-ROUND STATUS.
R.DISTRIB	REFERENCES ON DISTRIBUTION WITHIN THE STATE.
C.DISTRIB	COMMENTS ON DISTRIBUTION SECTION.
DATE.OUT	WORKBOOK TRACKING SYSTEM.
EDITOR	"
DATE.IN	"
R.ENVIRON.L	CONTAINS REFERENCE NUMBERS FOR THE LARVAL STAGE ENVIRON CODES.

Information from existing literature sources and agency records were obtained to facilitate data summary, and computerized literature surveys (e.g., DIALOG) were completed by Game Commission (PGC) staff. At the same time, consulting biologists were contracted with via Commonwealth competitive contracting procedures to review, critique, and summarize the available species information in the standard Species Workbook format. See Appendix A for a list of subcontractors.

Species Workbooks were reviewed and corrected as needed by PGC staff in Harrisburg. Species Workbook contents were entered into the Data Base, reviewed, and edited as necessary to compile a revised species record.

Description of Species Profile Contents

Species descriptions were compiled by species experts using the standard format, the Pennsylvania Fish and Wildlife Data Base Species Workbook. Appendix B contains a sample. This workbook provides a standard format for species profiles in ten information categories:

1. Taxonomy

Standard, generally accepted, taxonomic references are used to enter common and scientific names, and a complete taxonomic profile from phylum to subspecies. Also included is a narrative discussion of the species taxonomy, and commonly used scientific and common name synonyms that permit greater search efficiency.

2. Status

The status category allows for a description of the species current legal and use status within the Commonwealth and the identification of regulatory authorities. Status types are identified to facilitate locating federal/state endangered/threatened/vulnerable species, as well as a variety of other categories.

3. Distribution

Species distribution within Pennsylvania is discussed narratively and fully referenced. Distribution is coded into separate searchable fields by county using Federal Information Processing Standard (FIPS) codes; 7 1/2' quadrangles; U.S. Geological Survey, Office of Water Data Coordination (OWDC) Hydrologic Units; Bailey's Ecoregion Classification; Kuchler's Potential Natural Vegetation; and, for special status species, latitude/longitude of specific point and areal locations. Also included is species seasonal occurrence within each county and relative abundance by county.

4. *Habitat Associations*

Species - habitat associations are described narratively as discussed in the reviewed literature and using a series of standard habitat surrogates commonly used for habitat inventory and environmental review. Habitat associations used include the U.S. Geological Survey's Land Use and Land Cover Classification system; the U.S. Forest Service's Forest Inventory Classes and Timber Size Classes; and the U.S. Fish and Wildlife Service's National Wetland Inventory Classification System. Additionally, environmental (physical, biological, and ecological) associations and requirements were recorded for each species by life stage.

5. *Habitat Evaluation Procedures Models*

If final or draft habitat evaluation models were available for a species, this was recorded and the model type identified. Habitats and model elements are listed as well.

6. *Animal and Plant Associations*

Important animal and/or plant associations, e.g., commensalism, are described in this section.

7. *Food Habits*

Species food habits are described narratively and using a standard set of food resources. Foods consumed by each life stage (e.g., juvenile) are recorded separately.

8. *Life History*

A complete narrative profile of the species life history is compiled in six separate sections: physical description, origin within Pennsylvania, behavior, reproduction, population dynamics, and limiting factors. Select life history paramaters were recorded into 22 separate searchable fields.

9. *Management*

Management activities that affect the species survival and population levels either positively or negatively are narratively described and recorded using a standard set of management practices.

10. *References*

All the literature sources and other information sources referenced in compiling the previous nine sections are compiled in this category.

DATA BASE FORMAT

The revised format for the Pennsylvania Fish and Wildlife Data Base includes 169 separate fields of information for each species (Figure 7). Data from each completed Species Workbook are inserted into the Data Base in the designated fields.

Printouts or listings of species accounts before and after updating completed during this study provide an excellent illustration of the additional fields of information included in updating and additional values in existing data fields. Printouts of the Sedge wren prior to updating (Appendix D) and after updating (Appendix E) are provided for comparative purposes. A field-by-field comparison of these two printouts will highlight the new data fields for each species account, including the expanded narrative discussions and the additional values added in pre-existing fields.

In addition to the Sedge wren displayed in Appendices D and E, the following updated species accounts are provided as representative examples of the nature and extent of information generated by this project:

Appendix A. List of subcontractors used in compiling the computerized bird and mammal inventory for the Lake Erie Coastal Zone.

	Title	Address	Telephone
Dr. C.J. McCoy	Consultant	Carnegie Museum of Natural History Pittsburgh, PA	(412) 622-3258
Stephen A. Miller	Consultant	Eight Merion Lane Hummelstown, PA 17036	(717) 566-9992
Dr. Edward T. Reed	Consultant	T.E.S., Inc. Phoenix, NY 13135	(315) 695-7228
Timothy D. Brush	Consultant	Muddy Run Ecological Laboratory Drumore, PA 17518	(717) 548-2121
William S. Ettinger	Consultant	222 Lilac Lane Douglassville, PA 19518	(215) 385-6755

Appendix B. Sample Species Workbook.

Appendix C. Sample Abstract Species Workbook (including status and distribution composites only)

Appendix D. Sample Species Profile of the Sedge wren prior to updating.

Appendix E. Updated Species Profile of the Sedge wren.

Appendix F. Updated Species Profile of the American shad.

Appendix G. Updated Species Profile of the King rail.

Appendix H. Updated Species Profile of the Striped bass.

APPENDICES

APPENDIX A

List of Subcontractors

Appendix A. List of subcontractors used in compiling the computerized bird and mammal inventory for the Lake Erie Coastal Zone.

	Title	Address	Telephone
Dr. C.J. McCoy	Consultant	Carnegie Museum of Natural History Pittsburgh, PA	(412) 622-3258
Stephen A. Miller	Consultant	Eight Merion Lane Hummelstown, PA 17036	(717) 566-9992
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APPENDIX B

Species Workbook

Pennsylvania Fish and Wildlife Data Base

APPENDIX B.

Pennsylvania Fish and Wildlife Data Base

PENNSYLVANIA GAME COMMISSION
BUREAU OF LAND MANAGEMENT
P.O. BOX 1567
HARRISBURG, PENNSYLVANIA 17105-1567

SPECIES WORKBOOK

Species Code Number: _____

Species Common Name: _____

Species Scientific Name: _____

****

Workbook Compilers:

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

Workbook Reviewers:

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

****

Computer Entry:

Name: _____
Date: _____

Computer Entry Verification:

Name: _____
Date: _____

Date loaded into Data Base System: _____

P E N N S Y L V A N I A

F I S H A N D W I L D L I F E

D A T A B A S E

S P E C I E S W O R K B O O K

Pennsylvania Game Commission
P.O. Box 1567
Harrisburg, Pennsylvania 17105-1567

Developed by

Calvin W. DuBrock
Biometrician and Data Base Coordinator
Division of Environmental Impact
Assessment and Minerals
Bureau of Land Management

August 1984
(Revised September, 1985)

ACKNOWLEDGMENTS

This Species Workbook and the resulting Pennsylvania Fish and Wildlife Data Base are the result of a continuing effort over several years by many individuals and agencies to provide readily accessible species information for use in natural resource planning and management. Agencies that have contributed to this project over the many years include the U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Army Corps of Engineers, U.S. Office of Surface Mining, U.S. Soil Conservation Service, U.S. Forest Service, U.S. Nuclear Regulatory Commission, Pennsylvania Department of Environmental Resources, Pennsylvania Fish Commission, Missouri Department of Conservation, Colorado Division of Wildlife, Illinois Department of Conservation, Virginia Commission of Game and Inland Fisheries, and the Western Pennsylvania Conservancy.

Special thanks are due many for their support in this program and development of the workbook. In particular, I would like to recognize and thank for their assistance and helpful comments: Charles Cushwa, Gene Ludlow, Henry Gerke, James Brown, Glenn Gravatt, David Putnam, Jerry Touval, David Reese, John Forren, Richard Heaslip, Stephen Miller, Robert Brooks, Joseph Barnard, Richard Roth, Edwin Pentecost, Germain LaRoche, Daniel Devlin, Richard Croop, Ken Hickok, Paul Steblein, Jerry Hassinger, John Kriz, Bill Palmer, Bill Shope, Calvin Butchkoski, Jerry Wunz, Arnie Hayden, Fred Hartman, John Dunn, Gregory Grabowicz, John Byerly, Frank Mazzotti, and Bruce Anderson.

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PENNSYLVANIA
FISH AND WILDLIFE
DATA BASE

SPECIES WORKBOOK

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GENERAL INSTRUCTIONS

This Species Workbook has been developed to compile information in a standard format for the Pennsylvania Fish and Wildlife Data Base. The Data Base is a computerized library of species information that is keyword searchable, providing instant access to information for 840+ animals occurring in Pennsylvania. The Data Base provides an important focus for storing and acces sing animal for Pennsylvania species. Game Commission personnel and others use this Data Base for environmental assessments, habitat evaluation and management, species management research, wildlife extension, and education.

This workbook has been designed for compiling a complete, concise profile of the distribution, status, biology, and management of the species. You will find several "narrative" and "checklist" sections in this workbook, with specific instructions accompanying each section. Most of the reference materials required to complete a section have been incorporated into the instructions and checklists. Additional materials or references that might be required to correctly complete a section, but were too voluminous or inappropriate to include in the workbook, are included in the Species Workbook Supplemental Manual.

Some of the information requested in sections of the workbook will appear to be duplicated; therefore, it is important to understand the different functions of the narrative sections and checklists.

Narratives

The narratives should be written in a flowing, readable format. They should provide quick, fully referenced, documentation to the Data Base user for environmental assessments, planning decisions, etc. The narratives should be written to stand alone; that is, even if the information is requested again in a summary checklist, it is essential that all relevant/appropriate information for the topic be included in the narrative text. An individual retrieving narrative information from the Data Base probably will not have viewed any of the checklist information.

All information presented in these narratives must be referenced. Assign each reference a numerical code (sequentially beginning with Ø1, based upon order of appearance in the text); then record the complete citation in the REFERENCE section of this workbook. Use these codes along with the page numbers in the citation throughout the narratives to indicate the sources for each item of information; e.g., this species deposits eggs in warm, well-drained, sandy soils (Ø3:14, 14:35Ø-353, 15:4-5).

When completing the narratives (and other sections requesting text), it is preferred that the information first be drafted and then typed or neatly printed in the workbook. Slash all zeros ("Ø") to prevent confusion with the letter "O". These steps will greatly decrease the incidence of keypunch errors when the information is entered into the computer.

Summary Checklists

The checklists are designed to summarize selected information in the narratives into standardized keywords to allow rapid retrievals from the Data Base. Many of the checklist codes/words are established standards used by other agencies. By using these standards, the checklists will permit specific retrievals from the Data Base; e.g., what species occur in palustrine wetlands? These standard keywords also are useful for crosswalking to other existing databases or mapping systems and for regional/national summaries.

Use your professional judgment to resolve cases in which there may be overlap or gray areas in the checklists. If a species relationship to a standard code/word is uncertain, it is better to indicate a positive connection rather than not indicate it and not be able to retrieve the species in situations involving that code/word. Remember, the narratives will always serve as the definitive source for describing the species.

TAXONOMY

A. Taxonomic Nomenclature

Note: If this Workbook is being used to describe more than one subspecies, indicate all subspecies being described in the Taxonomic Narrative section. Complete the taxonomic description below to the species level only and enter the taxonomic authority for species.

Group (check only one):
- __ Amphibian
- __ Bird
- __ Crustacean
- __ Fish
- __ Insect - Aquatic
- __ Insect - Terrestrial
- __ Mammal
- __ Mollusc
- __ Other Aquatic Invertebrate (not insect)
- __ Other Terrestrial Invertebrate (not insect)
- __ Reptile

Phylum: _____

Subphylum: _____

Class: _____

Subclass: _____

Order: _____

Suborder: _____

Superfamily: _____

Family: _____

Subfamily: _____

Tribe: _____

Genus: _____

Subgenus: _____

Species: _____

Subspecies: _____

Taxonomic Authority and Date (for Species/Subspecies): _____

_____

B. Taxonomic Narrative

Briefly discuss any variations or disagreements on species identification, classification, and/or nomenclature. Identify any common synonyms for both common and scientific names found in the literature (past or present) or in use in other databases or by other administrative agencies. Additionally, identify type specimens and/or references to descriptions, photographs, drawings, or collections which may be useful for species identification. For all information provided in the narrative, provide reference codes identifying the information source and source page(s) within the text (e.g. Ø3:438-44Ø) and record the complete citation in the REFERENCE section at the back of this workbook.

C. Taxonomic Synonyms

Sequentially list (one per line) all other nomenclature variations and common names used for this species and reported in the Taxonomic Narrative.

Other Scientific Names (Genus, species, subspecies):

Other Common Names:

D. References for Taxonomy [enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma]:

STATUS

A. Status Narrative

Develop a narrative profile describing the current legal and use status of this species in the Commonwealth of Pennyslvania. If the species is recognized as endangered, threatened, or a species of special concern, indicate the reasons for the special status and factors that may be threatening to populations of the species. For federally listed species, include the date of listing, whether or not a federal recovery plan exists, and where designated critical habitats have been identified in Pennsylvania. Also, indicate all federal and state agencies that have executive, legislative, or other designated responsibilities for this species and describe the nature of this responsibility following the agency name. Provide appropriate reference codes including page number(s) for all information, and record the complete citation in the REFERENCE section at the back of this workbook.

Note: In developing this narrative, it may be helpful to be aware of the status categories that are included in the checklist that follows.

B. References for Status (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

_____

_____

_____

C. Status Checklist

Check all the status categories that apply to the species.

Code	Status	Definition
__ F-E	Federal Endangered	Species is officially classified by the Federal Government as being in danger of extinction throughout all or a significant part of its range. (Consult the Federal Register listing in the Species Workbook Supplemental Manual.)
__ F-T	Federal Threatened	Species is officially classified by the Federal Government as being likely to become endangered within the foreseeable future throughout all or a significant part of its range. (Consult the Federal Register listing in the Species Workbook Supplemental Manual.)
__ F-P	Federal Proposed	Species is officially identified by the Federal Government as being likely to become endangered or threatened and has been proposed for listing. (Consult the Federal Register listings in the Species Workbook Supplemental Manual.)
__ F-C	Federal Candidate	Species is offically identified by the Federal Government as under review or consideration for listin as an endangered or threatened species. (Consult the Federal Register listings in the Species Workbook Supplemental Manual.)
__ S-E	State Endangered	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as endangered.
__ S-T	State Threatened	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as threatened.

Code	Status	Definition
__ S-SC	State Special Concern Species	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as a species of special concern.
__ S-SU	State Status Undetermined	Species is officially recognized by the responsible State Government agency (Game Commission or Fish Commission) as status undetermined or status indeterminate.
__ S-X	State Extirpated	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as extirpated. These generally include species that have disappeared from Pennsylvania, but still exist elsewhere. For birds, includes species that do not presently nest in Pennsylvania, but did at one time.
__ MIGRATORY	Federal Migratory	Species is officially recognized by the Federal Government as a migratory bird in 50 CFR. (Consult the Species Workbook Supplemental Manual for a complete listing.)
__ COMMERCIAL	Commercial	Species is commercially harvested for fur or flesh value.
__ CONSUMP-REC	Consumptive Recreational	Species is harvested recreationally for fur, flesh, or trophy value and its defined as such by State or Federal Law; may be officially classified as "protected", "nongame", or "wild" animal.
__ NON-CONSUMP-REC	Non-consumptive Recreational	Species is not defined by State or Federal law as a species to be harvested recreationally; may be officially classified as "protected", "nongame", or "wild" animal.
__ INDICATOR	Biological Indicator	Species whose occurrence indicates environmental quality (e.g., presence indicates low levels of dissolved oxygen).
__ SENSITIVE	Sensitive	Species especially susceptible to environmental perturbation (e.g., raptor breeding success has been closely tied to pesticide application and exposure).
__ UNCLASSIFIED	Unclassified	Species has no recognized status in the Commonwealth of Pennsylvania or its status does not correspond to any of the above categories.

SPECIES DISTRIBUTION

The following sections have been designed to record the species distribution in the Commonwealth of Pennsylvania. First, the species distribution should be described in "narrative" form. Each item of information presented in this narrative should be referenced in the Narrative Reference section. After the narrative is completed, this information can then be used to fill out the remaining distribution sections [County distribution, distribution by watershed (OWDC Hydrologic Units), 1:24,000 scale USGS maps, latitude/longitude point locations, etc.].

Consider and use the following DEFINITIONS in completing the distribution section of this workbook:

Occurrence - a species occurs in an area if it breeds, winters, or significantly uses habitat in that area. A species would occur in an area if the animal occurs there sometime during the year and the presence of that area served some vital or essential role in the animal's life cycle (even though habitat utilization may not be considered great). When defining the species occurrence, remember that you are specifying those areas in which the species will be considered in environmental studies, research project planning, management planning, etc.

The following values will be used in recording species occurrence geographically in the Commonwealth: known to occur, known not to occur, occurrence is unknown. Use the following guideline and definitions to interpret reports and other data sources for recording species distribution and occurrence:

Known to occur: a species has "known" occurrence in an area if there exists recorded sightings, specimen data, and documentation/evidence that suggest occurrence (e.g., sightings in an area of previously documented ocurrence), or documentation/evidence judged by professional, expert opinion to be valid. Range maps might, but do not necessarily, qualify or meet these criteria. Occurrence must qualify as defined above.

Known not to occur: a species is "known not to occur" in an area, i.e., area is outside the range of the species distribution. This value only applies for County Distribution.

Unknown: a species occurrence in the area is unknown, i.e., unable to determine from the available information base or from expert opinion whether species occurrence is "known" in an area or whether the species is "known not to occur" in an area.

A. Distribution Narrative

The Distribution Narrative section is provided for compiling a complete profile of the species distribution within Pennyslvania. The schematic below is provided for mapping the species distribution.

This narrative will provide the core or base for data recorded in subsequent distribution sections and the database. Individuals accessing the database should find in this narrative a complete and concise description of known locations of the species and/or populations of the species, and be able to discern breeding locations, wintering locations, and areas of migratory occurrences.

In the first paragraph, provide a brief description of the species current and historic distribution in the Commonwealth. (This paragraph should be brief and concise, not exceeding 3-4 sentences or 10 lines of text.) In the next paragraphs, highlight areas of year-round occurrence, seasonal occurrence, and migratory occurrence. If the species is migratory only in Pennsylvania, indicate the general migratory movement pattern (e.g. by major water drainage or mountain chain) and general dates of movement.

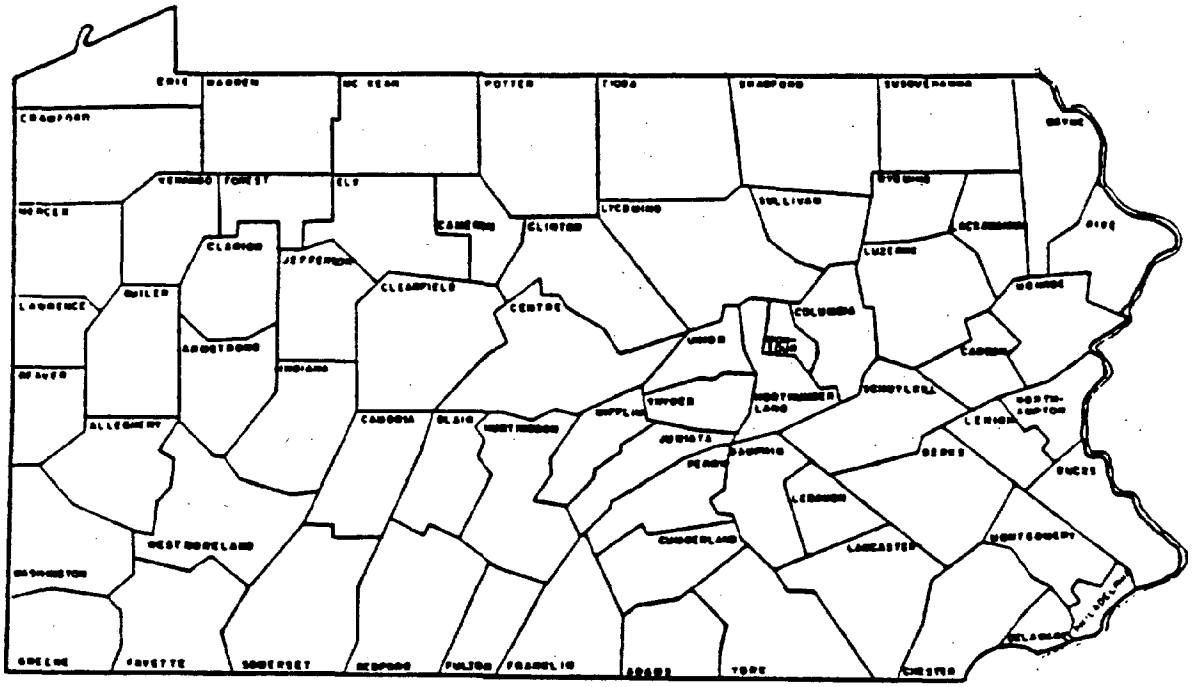
When describing the species distribution in these paragraphs, first indicate the general area of occurrences (region, county, watershed, national forest, game lands, state park/forest, etc.), then record information (if feasible) on site locations using reference points such as cities, roads/mileposts, topographic features/elevations, rivers/streams/reservoirs, quads, latitude/longitude, UTM coordinates, etc.

Be sure that possible occurrence (speculation and professional opinion) is noted as such, and that the occurrence type or mode is indicated (i.e., breeds in the following locations: . . .; winters in the following locations: . . ., etc.). Information related to relative abundance might also be included when available.

If precise distribution is considered too sensitive or secure to present in this workbook and the database give the name, title, affiliation, address, and business telephone number of the person(s) maintaining this information. Make certain that the individual(s) is consulted prior to providing the information.

Be certain to follow each item of distribution information with the reference code indicating the source of information, e.g., "known to occur in southeastern Pennsylvania in the counties of Chester, Delaware, and Berks (03:21, 05:14-16, 11:140)." Note that persons providing expert opinion/interpretation are considered a reference and should be assigned a reference code and cited in the REFERENCE section at the back of this workbook.

Map the species distribution below and narratively describe the distribution as instructed above in the space provided below and on the following pages.



Area location

Point location

FOR BIRDS ONLY

Breeding locations

Wintering locations

Migration corridors

B. <u>References for Distribution</u> (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

C. Statewide Resident Status

Check the one category that best describes the species' resident status in the Commonwealth.

	Code	Status	Definition
__	RES-B	Breeding Resident Only	Species primarily present during the breeding season only.
__	RES-W	Winter Resident Only	Species only present during most or all of the winter months.
__	RES-YR	Year-round Resident	Species breeds in Pennsylvania and is present year-round.
__	MIGRANT	Migratory Species	Species does not occur in Pennsylvania year-round or for an extended time period as described above, (i.e. is not a breeding or winter resident). Pensylvania is used only as a migration corridor.
__	UNKNOWN	Unknown	Species for which so few records exist in Pennsylvania that it cannot be classified into a different resident status cateogory.

D. Distribution by County

Complete the table that follows indicating species occurrence at the county level, seasonal occurrence within the counties in which the species "occurs", and species relative abundance within counties in which the species "occurs". Your entries in this table must correspond with information presented in the Distribution Narrative (Section A). Use the following codes and definitions in completing the table.

1. Occurrence codes and definitions are those defined earlier in the definitions.

Occurrence Codes

O - Known to occur
N - Known not to occur
X - Occurrence is unknown

2. Seasonal occurrence codes should be entered for counties in which the species is "known to occur". If the species does not occur in a county, or its occurence in a county is unknown, do not make an entry in that county blank for seasonal occurrence.

Seasonal Occurrence Codes

A - Spring Migration only
B - Spring Migration/Breeding Season
C - Spring Migration/Fall Migration
D - Spring Migration/Winter Season
E - Spring Migration/Breeding Season/Fall Migration
F - Spring Migration/Breeding Season/Winter Season
G - Spring Migration/Fall Migration/Winter Season
H - Breeding Season only
I - Breeding Season/Fall Migration
J - Breeding Season/Winter Season
K - Breeding Season/Fall Migration/Winter Season
L - Fall Migration only
M - Fall Migration/Winter Season
N - Winter Season only

O - Year-round Resident

X - Occurrence in the county by season is unknown

3. Abundance codes should be entered for counties in which the species is "known to occur". If the species does not occur in a county, or its occurrence in a county is unknown, do not make an entry in that county blank for relative species abundance.

Abundance Codes

A - abundant (occurs regularly or in large numbers in appropriate habitat or season or is frequently observed)
C - medium abundance (i.e., common - occurs in small numbers in appropriate habitat or season; observed occasionally in prime habitat)
U - low abundance (i.e., uncommon - occupies a small percentage of suitable habitat; occupies a very specific limited habitat; very few individuals observed in prime habitat)
X - abundance in county is unknown

County Name	County FIPS Code	Occurrence Code	Seasonal Occurrence Code	Abundance Code
ALL COUNTIES	ALL	____	____	____
Adams	001	____	____	____
Allegheny	003	____	____	____
Armstrong	005	____	____	____
Beaver	007	____	____	____
Bedford	009	____	____	____
Berks	011	____	____	____
Blair	013	____	____	____
Bradford	015	____	____	____
Bucks	017	____	____	____
Butler	019	____	____	____
Cambria	021	____	____	____
Cameron	023	____	____	____
Carbon	025	____	____	____
Centre	027	____	____	____
Chester	029	____	____	____
Clarion	031	____	____	____
Clearfield	033	____	____	____
Clinton	035	____	____	____
Columbia	037	____	____	____
Crawford	039	____	____	____
Cumberland	041	____	____	____
Dauphin	043	____	____	____
Delaware	045	____	____	____
Elk	047	____	____	____
Erie	049	____	____	____
Fayette	051	____	____	____
Forest	053	____	____	____
Franklin	055	____	____	____
Fulton	057	____	____	____
Greene	059	____	____	____
Huntingdon	061	____	____	____
Indiana	063	____	____	____
Jefferson	065	____	____	____
Juniata	067	____	____	____

****

Occurrence Codes

O - Known to occur
N - Known not to occur
X - Occurrence is unknown

Seasonal Occurrence Codes

A - Spring Migration only
B - Spring Migration/Breeding Season
C - Spring Migration/Fall Migration
D - Spring Migration/Winter Season
E - Spring Migration/Breeding Season/Fall Migration
F - Spring Migration/Breeding Season/Winter Season
G - Spring Migration/Fall Migration/Winter Season
H - Breeding Season only
I - Breeding Season/Fall Migration
J - Breeding Season/Winter Season
K - Breeding Season/Fall Migration/Winter Season
L - Fall Migration only
M - Fall Migration/Winter Season
N - Winter Season only

O - Year-round Resident

X - Occurrence in the county by season is unknown

Abundance Codes

A - Abundant
C - Medium abundance
U - Low abundance
X - Abundance is unknown

County Name	County FIPS Code	Occurrence Code	Seasonal Occurrence Code	Abundance Code
Lackawanna	069			
Lancaster	071			
Lawrence	073			
Lebanon	075			
Lehigh	077			
Luzerne	079			
Lycoming	081			
McKean	083			
Mercer	085			
Mifflin	087			
Monroe	089			
Montgomery	091			
Montour	093			
Northampton	095			
Northumberland	097			
Perry	099			
Philadelphia	101			
Pike	103			
Potter	105			
Schuylkill	107			
Snyder	109			
Somerset	111			
Sullivan	113			
Susquehanna	115			
Tioga	117			
Union	119			
Venango	121			
Warren	123			
Washington	125			
Wayne	127			
Westmoreland	129			
Wyoming	131			
York	133			

Occurrence Codes

O - Known to occur
N - Known not to occur
X - Occurrence is unknown

Seasonal Occurrence Codes

A - Spring Migration only
B - Spring Migration/Breeding Season
C - Spring Migration/Fall Migration
D - Spring Migration/Winter Season
E - Spring Migration/Breeding Season/Fall Migration
F - Spring Migration/Breeding Season/Winter Season
G - Spring Migration/Fall Migration/Winter Season
H - Breeding Season only
I - Breeding Season/Fall Migration
J - Breeding Season/Winter Season
K - Breeding Season/Fall Migration/Winter Season
L - Fall Migration only
M - Fall Migration/Winter Season
N - Winter Season only

O - Year-round Resident

X - Occurrence in the county by season is unknown

Abundance Codes

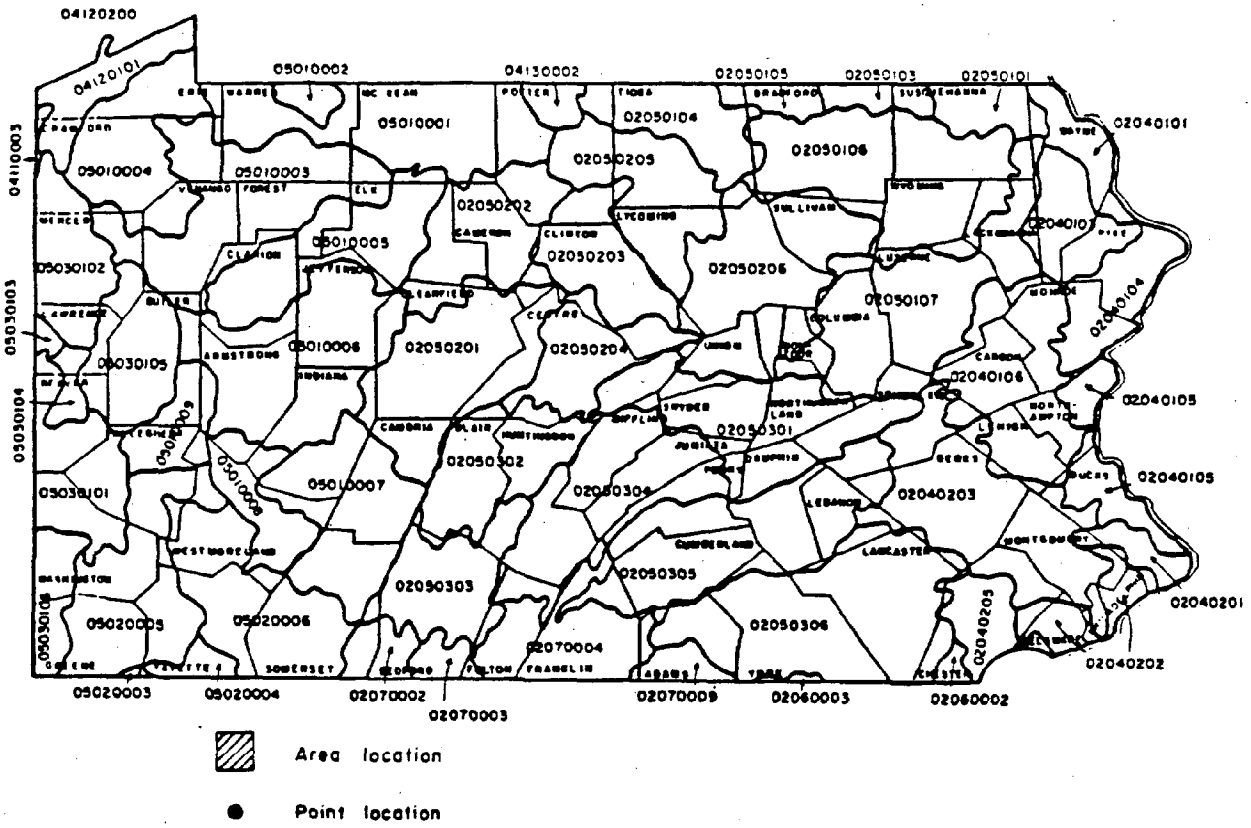
A - Abundant
C - Medium abundance
U - Low abundance
X - Abundance is unknown

General Distribution

E. Distribution by Office of Water Data Coordination (OWDC) Hydrologic Units in Pennsylvania

NOTE: OWDC hydrologic units refer to watersheds in the state, not aquatic habitats only; therefore, complete this section for all species. For bird species, entries should correspond with "resident" occurrence (breeding, wintering, year-round occurrences).

Using the map provided below (or the large scale - 1:500,000 USGS Hydrologic Unit Map of Pennsylvania) and the checklist on the next two pages, check all the OWDC hydrologic units (watersheds) in which the species "occurs". If the species is found statewide and in all watersheds, check "all" at the top of the list. Your entries should correspond with county level occurrence information (Section D) and the Distribution Narrative (Section A).



E. Distribution by OWDC Hydrologic Units (continued)

__ Species occurs in all OWDC hydrologic units to cataloging unit level as displayed on the USGS Hydrologic Unit Map.

Species does not occur statewide (i.e., in all OWDC hydrologic units), but occurs in the following units:

	Code	Definition
__	02040101	Upper Delaware: Upper Delaware
__	02040103	Upper Delaware: Lackawaxen
__	02040104	Upper Delaware: Middle Delaware - Mongaup - Brodhead
__	02040105	Upper Delaware: Middle Delaware - Musconetcong
__	02040106	Upper Delaware: Lehigh
__	02040201	Lower Delaware: Crosswicks - Neshaminy
__	02040202	Lower Delaware: Lower Delaware
__	02040203	Lower Delaware: Schuylkill
__	02040205	Lower Delaware: Brandywine - Christina
__	02050101	Upper Susquehanna: Upper Susquehanna
__	02050103	Upper Susquehanna: Owego - Wappasening
__	02050104	Upper Susquehanna: Tioga
__	02050105	Upper Susquehanna: Chemung
__	02050106	Upper Susquehanna: Upper Susquehanna - Tunkhannock
__	02050107	Upper Susquehanna: Upper Susquehanna - Lackawanna
__	02050201	West Branch Susquehanna: Upper West Branch Susquehanna
__	02050202	West Branch Susquehanna: Sinnemahoning
__	02050203	West Branch Susquehanna: Middle West Branch Susquehanna
__	02050204	West Branch Susquehanna: Bald Eagle
__	02050205	West Branch Susquehanna: Pine
__	02050206	West Branch Susquehanna: Lower West Branch Susquehanna
__	02050301	Lower Susquehanna: Lower Susquehanna - Penns
__	02050302	Lower Susquehanna: Upper Juniata
__	02050303	Lower Susquehanna: Raystown
__	02050304	Lower Susquehanna: Lower Juniata
__	02050305	Lower Susquehanna: Lower Susquehanna - Swatara
__	02050306	Lower Susquehanna: Lower Susquehanna
__	02060002	Upper Chesapeake: Chester - Sassafras
__	02060003	Upper Chesapeake: Gunpowder - Patapsco
__	02070002	Potomac: North Branch Potomac
__	02070003	Potomac: Cacapon - Town
__	02070004	Potomac: Conococheague - Opequon
__	02070009	Potomac: Monocacy
__	04110003	Southern Lake Erie: Ashtabula
__	04120101	Eastern Lake Erie: Chautauqua - Conneaut
__	04120200	Lake Erie: Lake Erie

E. Distribution by OWDC Hydrologic Units (continued)

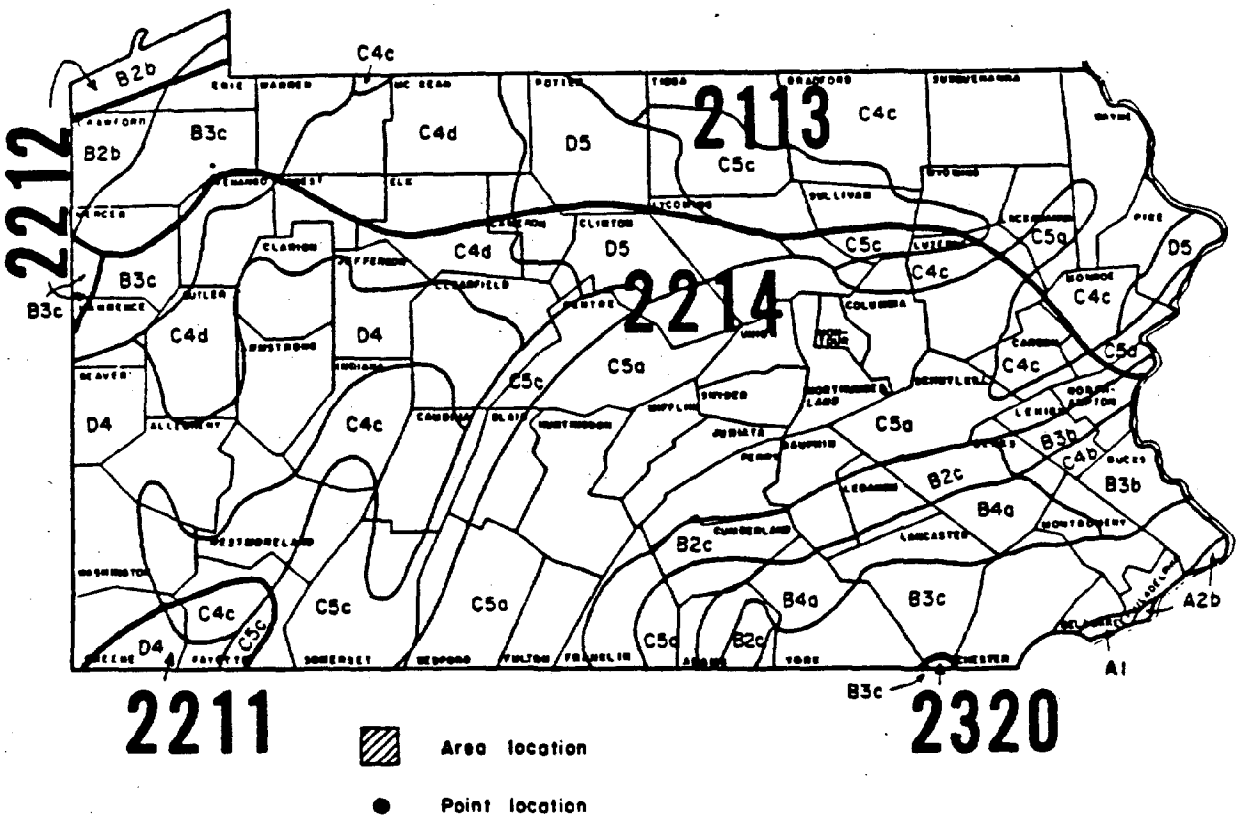
	Code	Definition
__	04130002	Southwestern Lake Ontario: Upper Genesee
__	05010001	Allegheny: Upper Allegheny
__	05010002	Allegheny: Conewango
__	05010003	Allegheny: Middle Allegheny
__	05010004	Allegheny: French
__	05010005	Allegheny: Clarion
__	05010006	Allegheny: Middle Allegheny - Redbank
__	05010007	Allegheny: Conemaugh
__	05010008	Allegheny: Kiskiminetas
__	05010009	Allegheny: Lower Allegheny
__	05020003	Monongahela: Upper Monongahela
__	05020004	Monongahela: Cheat
__	05020005	Monongahela: Lower Monongahela
__	05020006	Monongahela: Youghiogheny
__	05030101	Upper Ohio: Upper Ohio
__	05030102	Upper Ohio: Shenango
__	05030103	Upper Ohio: Mahoning
__	05030104	Upper Ohio: Beaver
__	05030105	Upper Ohio: Connoquenessing
__	05030106	Upper Ohio: Upper Ohio - Wheeling

F. Distribution by Ecoregions and Land Surface Forms in Pennsylvania

NOTE: Complete this section for all species.

Ecoregions are designed to stratify ecologically similar areas based on vegetation, soils, climate, and other factors. They are named after a vegetation type characteristic of the area and secondarily by landform. Although an animal species may not specifically associate with the particular vegetation type and/or landform used to name a region (e.g. Appalachian Oak Forest, High Hills), if it "occurs" in that map unit, it should be marked as occurring in that ecoregion.

Using the ecoregion map provided below and the checklist on the next page, check all ecoregions in which the species "occurs". For descriptions and definitions consult the explanatory notes in the Species Workbook Supplemental Manual. Bird species entries should correspond with "resident" occurrence (i.e., breeding, wintering, year-round occurrences). All entries should correspond with county level occurrence information (Section D), and the Distribution Narrative (Section A).



F. Distribution by Ecoregions and Land Surface Forms in Pennsylvania (cont.)

__ Species occurs in all Ecoregions and Land Surface Forms in Pennsylvania as displayed on the preceding map.

Species does not occur statewide (i.e., in all Ecoregions and Land Surface Forms in Pennsylvania), but occurs in the following units:

	Code	Definition
__	2113B2b	Northern Hardwoods Forest, 50-80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is in lowland
__	2113B3c	Northern Hardwoods Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland
__	2113C4c	Northern Hardwoods Forest, 20-50% gently sloping, 500-1000 ft. elevation, 50-75% of gentle slope is on upland
__	2113C4d	Northern Hardwoods Forest, 20-50% gently sloping, 500-1000 ft. elevation, more than 75% of gentle slope is on upland
__	2113C5a	Northern Hardwoods Forest, 20-50% gently sloping, 1000-3000 ft. elevation, more than 75% of gentle slope is in lowland
__	2113C5c	Northern Hardwoods Forest, 20-50% gently sloping, 1000-3000 ft. elevation, 50-75% of gentle slope is on upland
__	2113D5Ø	Northern Hardwoods Forest, less than 20% gently sloping, 1000-3000 ft. elevation
__	2211C4c	Mixed Mesophytic Forest, 20-50% gently sloping, 500-1000 ft. elevation, 50-75% of gentle slope is on upland
__	2211C5c	Mixed Mesophytic Forest, 20-50% gently sloping, 1000-3000 ft. elevation, 50-75% of gentle slope is on upland
__	2211D4Ø	Mixed Mesophytic Forest, less than 20% gently sloping, 500-1000 ft. elevation
__	2212B2b	Beech-Maple Forest, 50-80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is in lowland
__	2212B3c	Beech-Maple Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland
__	2214A1Ø	Appalachian Oak Forest, more than 80% gently sloping, 0-100 ft. elevation
__	2214A2b	Appalachian Oak Forest, more than 80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is in lowland
__	2214B2c	Appalachian Oak Forest, 50-80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is on upland
__	2214B3b	Appalachian Oak Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on lowland
__	2214B3c	Appalachian Oak Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland
__	2214B4a	Appalachian Oak Forest, 50-80% gently sloping, 500-1000 ft. elevation, less than 75% of gentle slope is in lowland
__	2214C4c	Appalachian Oak Forest, 20-50% gently sloping, 500-1000 ft. elevation, 50-75% of gentle slope is on upland

F. Distribution by Ecoregions and Land Surface Forms in Pennsylvania (cont.)

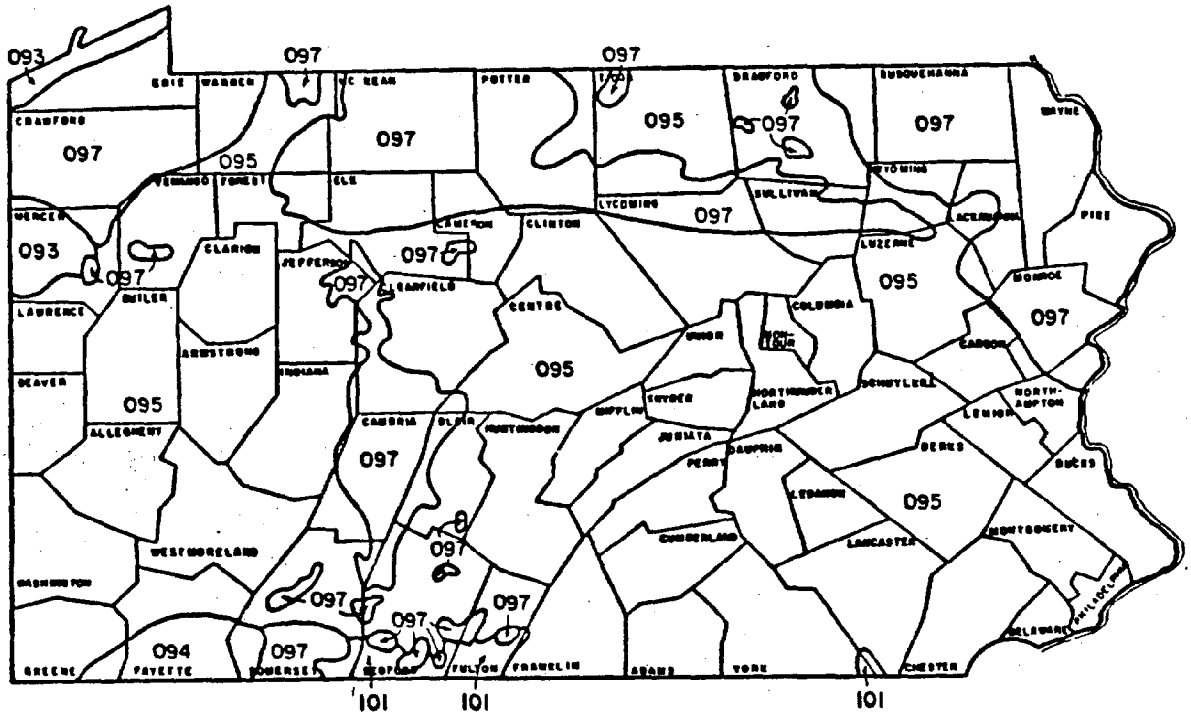
	Code	Definition
__	2214C4d	Appalachian Oak Forest, 20-50% gently sloping, 500-1000 ft. elevation, more than 75% of gentle slope is on upland
__	2214C5a	Appalachian Oak Forest, 20-50% gently sloping, 1000-3000 ft. elevation, less than 75% of gentle slope is in lowland
__	2214C5c	Appalachian Oak Forest, 20-50% gently sloping, 1000-3000 ft. elevation, 50-75% of gentle slope is on upland
__	2214D4Ø	Appalachian Oak Forest, less than 20% gently sloping, 500-1000 ft. elevation
__	2214D5Ø	Appalachian Oak Forest, less than 20% gently sloping, 1000-3000 ft. elevation
__	2320B3c	Southern Mixed Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland

G. Distribution by Potential Natural Vegetation Types in Pennsylvania

NOTE: Complete this section for all species.

Potential natural vegetation types are vegetation types that would exist today if man were removed and plant succession after his removal were telescoped into a single moment; however, the effects of man's earlier activities are permitted to stand. As such the potential natural vegetation type portrays the biological potential of a site.

Using the map provided below and the checklist on the next page (or a large scale USGS map of potential natural vegetation types), identify all the potential natural vegetation types in which the species "occurs". Bird species entries should correspond with resident occurrence (i.e., breeding, wintering, year-round occurrences). Keep in mind that if the species "occurs" in the map unit, it should be marked as occurring in the potential natural vegetation type. All entries should correspond with county level occurrence information (Section D) and the Distribution Narrative (Section A).



G. Distribution by Potential Natural Vegetation Types in Pennsylvania (cont.)

__ Species occurs in all Potential Natural Vegetation types in Pennsylvania as displayed on the preceding page.

Species does not occur statewide (i.e., in all Potential Natural Vegetation types in Pennsylvania), but occurs in the following types:

	Code	Definition
__	093	Beech-Maple Forest
__	094	Mixed Mesophytic Forest
__	095	Appalachian Oak Forest
__	097	Northern Hardwoods
__	101	Oak-Hickory-Pine Forest

Site-Specific Distribution

H. Distribution by 7 1/2' Quadrangles

NOTE: Complete this section for all species.

Using the U.S. Geological Survey Index to Topographic Map Coverage in Pennsylvania provided in the Species Workbook Supplemental Manual, identify the seven (7) digit USGS 7 1/2' quadrangle code(s) and names that define the species occurrence within the Commonwealth of Pennsylvania. The format for quadrangle codes is as follows:

```
_ _/_ _ _/_/_
LAT  LONG UP OVER
          (N) (W)
```

The first two digits indicate the reference point latitude in degrees; the third, fourth, and fifth digits indicate the reference point longitude (values are right-justified - all longitudes in PA. would begin with 0, e.g., 80 would be 080); the sixth digit is the vertical one-degree row number counting up from the reference point; and the seventh digit is the horizontal one-degree cell counting over from the vertical row number. This is diagrammatically described in the appendix to the USGS 7 1/2' (1:24,000) series Quadrangle Map in the Species Workbook Supplemental Manual.

All entries should correspond with occurrence information provided in the Distribution Narrative (Section A).

__ Species occurs in all 7 1/2' quadrangles in Pennsylvania.

Species does not occur statewide, but occurs in the following quadrangle:

	Quad No.	Quad Name		Quad No.	Quad Name
__	3907567	Newark West	__	3907661	Rising Sun
__	3907568	Bay View	__	3907662	Conowingo Dam
__	3907572	Woodbury	__	3907663	Delta
__	3907573	Bridgeport	__	3907664	Fawn Grove
__	3907574	Marcus Hook	__	3907665	Norrisville
__	3907575	Wilmington North	__	3907666	New Freedom
__	3907576	Kennett Square	__	3907667	Lineboro
__	3907577	West Grove	__	3907668	Manchester
__	3907578	Oxford	__	3907671	Kirkwood
__	3907581	Camden	__	3907672	Wakefield
__	3907582	Philadelphia	__	3907673	Holtwood
__	3907583	Lansdowne	__	3907674	Airville
__	3907584	Media	__	3907675	Stewartstown
__	3907585	West Chester	__	3907676	Glen Rock
__	3907586	Unionville	__	3907677	Seven Valleys
__	3907587	Coatesville	__	3907678	Hanover
__	3907588	Parkesburg	__	3907681	Gap
			__	3907682	Quarryville
			__	3907683	Conestoga

	Quad No.	Quad Name
___	3907684	Safe Harbor
___	3907685	Red Lion
___	3907686	York
___	3907687	West York
___	3907688	Abbottstown
___	3907761	Littlestown
___	3907762	Taneytown
___	3907763	Emmitsburg
___	3907764	Blue Ridge Summit
___	3907765	Smithsburg
___	3907766	Hagerstown
___	3907767	Mason Dixon
___	3907768	Clear Spring
___	3907771	McSherrystown
___	3907772	Gettysburg
___	3907773	Fairfield
___	3907774	Iron Springs
___	3907775	Waynesboro
___	3907776	Greencastle
___	3907777	Williamson
___	3907778	Mercersburg
___	3907781	Hampton
___	3907782	Biglerville
___	3907783	Arendtsville
___	3907784	Caledonia Park
___	3907785	Scotland
___	3907786	Chambersburg
___	3907787	St. Thomas
___	3907788	McConnellsburg
___	3907861	Cherry Run
___	3907862	Hancock (W. VA.)
___	3907863	Bellegrove
___	3907864	Artemas
___	3907865	Flintstone
___	3907866	Evitts Creek
___	3907867	Cumberland
___	3907868	Frostburg
___	3907871	Big Cove Tannery
___	3907872	Needmore
___	3907873	Amaranth
___	3907874	Chaneysville
___	3907875	Beans Cove
___	3907876	Hyndman
___	3907877	Fairhope
___	3907878	Wittenberg
___	3907881	Meadow Grounds
___	3907882	Breezewood
___	3907883	Mench
___	3907884	Clearville
___	3907885	Rainsburg
___	3907886	Buffalo Mills
___	3907887	New Baltimore
___	3907888	Berlin

	Quad No.	Quad Name
___	3907961	Avilton
___	3907962	Grantsville
___	3907963	Accident
___	3907964	Friendsville (MD)
___	3907965	Brandonville
___	3907966	Bruceton Mills
___	3907967	Lake Lynn
___	3907968	Morgantown North
___	3907971	Meyersdale
___	3907972	Markleton
___	3907973	Confluence
___	3907974	Ohiopyle
___	3907975	Ft Necessity
___	3907976	Brownfield
___	3907977	Smithfield
___	3907978	Masontown
___	3907981	Murdock
___	3907982	Rockwood
___	3907983	Kingwood
___	3907984	Mill Run
___	3907985	South Connellsville
___	3907986	Uniontown
___	3907987	New Salem
___	3907988	Carmichaels
___	3908061	Osage
___	3908062	Blacksville
___	3908063	Wadestown
___	3908064	Hundred
___	3908065	Littleton
___	3908071	Garards Fort
___	3908072	Oak Forest
___	3908073	Holbrook
___	3908074	New Freeport
___	3908075	Cameron (W. VA.)
___	3908081	Mather
___	3908082	Waynesburg
___	3908083	Rogersville
___	3908084	Wind Ridge
___	3908085	Majorsville
___	4007417	Bristol
___	4007418	Beverly
___	4007426	Trenton East
___	4007427	Trenton West
___	4007428	Langhorne
___	4007437	Pennington
___	4007438	Lambertville
___	4007448	Stockton
___	4007511	Frankford
___	4007512	Germantown
___	4007513	Norristown
___	4007514	Valley Forge

	Quad No.	Quad Name
___	4007515	Malvern
___	4007516	Downingtown
___	4007517	Wagontown
___	4007518	Honey Brook
___	4007521	Hatboro
___	4007522	Ambler
___	4007523	Lansdale
___	4007524	Collegeville
___	4007525	Phoenixville
___	4007526	Pottstown
___	4007527	Elverson
___	4007528	Morgantown
___	4007531	Buckingham
___	4007532	Doylestown
___	4007533	Telford
___	4007534	Perkiomenville
___	4007535	Sassamansville
___	4007536	Boyertown
___	4007537	Birdsboro
___	4007538	Reading
___	4007541	Lumberville
___	4007542	Bedminster
___	4007543	Quakertown
___	4007544	Milford Square
___	4007545	East Greenville
___	4007546	Manatawny
___	4007547	Fleetwood
___	4007548	Temple
___	4007551	Frenchtown
___	4007552	Riegelsville
___	4007553	Hellertown
___	4007554	Allentown East
___	4007555	Allentown West
___	4007556	Topton
___	4007557	Kutztown
___	4007558	Hamburg
___	4007562	Easton
___	4007563	Nazareth
___	4007564	Catasauqua
___	4007565	Cementon
___	4007566	Slatedale
___	4007567	New Tripoli
___	4007568	New Ringgold
___	4007571	Belvidere
___	4007572	Bangor
___	4007573	Wind Gap
___	4007574	Kunkletown
___	4007575	Palmerton
___	4007576	Lehighton
___	4007577	Nesquehoning
___	4007578	Tamaqua
___	4007581	Portland
___	4007582	Stroudsburg
___	4007583	Saylorsburg
___	4007584	Brodheadsville

	Quad No.	Quad Name
___	4007585	Pohopoco Mtn
___	4007586	Christmans
___	4007587	Weatherly
___	4007588	Hazleton
___	4007611	New Holland
___	4007612	Leola
___	4007613	Lancaster
___	4007614	Columbia East
___	4007615	Columbia West
___	4007616	York Haven
___	4007617	Dover
___	4007618	Wellsville
___	4007621	Terre Hill
___	4007622	Ephrata
___	4007623	Lititz
___	4007624	Manheim
___	4007625	Elizabethtown
___	4007626	Middletown
___	4007627	Steelton
___	4007628	Lemoyne
___	4007631	Sinking Spring
___	4007632	Womelsdorf
___	4007633	Richland
___	4007634	Lebanon
___	4007635	Palmyra
___	4007636	Hershey
___	4007637	Harrisburg East
___	4007638	Harrisburg West
___	4007641	Bernville
___	4007642	Strausstown
___	4007643	Bethel
___	4007644	Fredericksburg
___	4007645	Indiantown Gap
___	4007646	Grantville
___	4007647	Enders
___	4007648	Halifax
___	4007651	Auburn
___	4007652	Friedensburg
___	4007653	Swatara Hill
___	4007654	Pine Grove
___	4007655	Tower City
___	4007656	Lykens
___	4007657	Elizabethville
___	4007658	Millersburg
___	4007661	Orwigsburg
___	4007662	Pottsville
___	4007663	Minersville
___	4007664	Tremont
___	4007665	Valley View
___	4007666	Klingerstown
___	4007667	Pillow
___	4007668	Dalmatia
___	4007671	Delano
___	4007672	Shenandoah

	Quad No.	Quad Name
___	4007673	Ashland
___	4007674	Mt Carmel
___	4007675	Shamokin
___	4007676	Trevorton
___	4007677	Sunbury
___	4007678	Freeburg
___	4007681	Conyngham
___	4007682	Nuremberg
___	4007683	Shumans
___	4007684	Catawissa
___	4007685	Danville
___	4007686	Riverside
___	4007687	Northumberland
___	4007688	Lewisburg
___	4007711	Dillsburg
___	4007712	Mount Holly Springs
___	4007713	Dickinson
___	4007714	Walnut Bottom
___	4007715	Shippensburg
___	4007716	Roxbury
___	4007717	Fannettsburg
___	4007718	Burnt Cabins
___	4007721	Mechanicsburg
___	4007722	Carlisle
___	4007723	Plainfield
___	4007724	Newville
___	4007725	Newburg
___	4007726	Doylesburg
___	4007727	Shade Gap
___	4007728	Orbisonia
___	4007731	Wertzville
___	4007732	Shermansdale
___	4007733	Landisburg
___	4007734	Andersonburg
___	4007735	Blain
___	4007736	Blairs Mills
___	4007737	Aughwick
___	4007738	Butler Knob
___	4007741	Duncannon
___	4007742	Newport
___	4007743	Ickesburg
___	4007744	Spruce Hill
___	4007745	McCoysville
___	4007746	McVeytown
___	4007747	Newton Hamilton
___	4007748	Mount Union
___	4007751	Reward
___	4007752	Millerstown
___	4007753	Mexico
___	4007754	Mifflintown
___	4007755	Lewistown
___	4007756	Belleville
___	4007757	Allensville

	Quad No.	Quad Name
___	4007758	Donation
___	4007761	Richfield
___	4007762	Beaver Springs
___	4007763	McClure
___	4007764	Alfarata
___	4007765	Burnham
___	4007766	Barrville
___	4007767	McAlevys Fort
___	4007768	Pine Grove Mills
___	4007771	Middleburg
___	4007772	Beavertown
___	4007773	Weikert
___	4007774	Coburn
___	4007775	Spring Mills
___	4007776	Centre Hall
___	4007777	State College
___	4007778	Julian
___	4007781	Mifflinburg
___	4007782	Hartleton
___	4007783	Woodward
___	4007784	Millheim
___	4007785	Madisonburg
___	4007786	Mingoville
___	4007787	Bellefonte
___	4007788	Bear Knob
___	4007811	Hustontown
___	4007812	Wells Tannery
___	4007813	Everett East
___	4007814	Everett West
___	4007815	Bedford
___	4007816	Schellsburg
___	4007817	Central City
___	4007818	Stoystown
___	4007821	Saltillo
___	4007822	Saxton
___	4007823	Hopewell
___	4007824	New Enterprise
___	4007825	Alum Bank
___	4007826	Ogletown
___	4007827	Windbur
___	4007828	Hooversville
___	4007831	Cassville
___	4007832	Entriken
___	4007833	Martinsburg
___	4007834	Roaring Spring
___	4007835	Blue Knob
___	4007836	Beaverdale
___	4007837	Geistown
___	4007838	Johnstown
___	4007841	Huntingdon
___	4007842	Williamsburg
___	4007843	Frankstown
___	4007844	Hollidaysburg

	Quad No.	Quad Name
___	4007845	Cresson
___	4007846	Ebensburg
___	4007847	Nanty Glo
___	4007848	Vintondale
___	4007851	Alexandria
___	4007852	Spruce Creek
___	4007853	Bellwood
___	4007854	Altoona
___	4007855	Ashville
___	4007856	Carrolltown
___	4007857	Colver
___	4007858	Strongstown
___	4007861	Franklinville
___	4007862	Tyrone
___	4007863	Tipton
___	4007864	Blandburg
___	4007865	Coalport
___	4007866	Hastings
___	4007867	Barnesboro
___	4007868	Commodore
___	4007871	Port Matilda
___	4007872	Sandy Ridge
___	4007873	Houtzdale
___	4007874	Ramey
___	4007875	Irvona
___	4007876	Westover
___	4007877	Burnside
___	4007878	Rochester Mills
___	4007881	Black Moshannon
___	4007882	Philipsburg
___	4007883	Wallaceton
___	4007884	Glen Richey
___	4007885	Curwensville
___	4007886	Mahaffey
___	4007887	McGees Mills
___	4007888	Punxsutawney
___	4007911	Somerset
___	4007912	Bakersville
___	4007913	Seven Springs
___	4007914	Donegal
___	4007915	Connellsville
___	4007916	Dawson
___	4007917	Fayette City
___	4007918	California
___	4007921	Boswell
___	4007922	Ligonier
___	4007923	Stahlstown
___	4007924	Mammoth
___	4007925	Mt Pleasant
___	4007926	Smithton
___	4007927	Donora
___	4007928	Monongahela
___	4007931	Rachelwood

	Quad No.	Quad Name
___	4007932	Wilpen
___	4007933	Derry
___	4007934	Latrobe
___	4007935	Greensburg
___	4007936	Irwin
___	4007937	McKeesport
___	4007938	Glassport
___	4007941	New Florence
___	4007942	Bolivar
___	4007943	Blairsville
___	4007944	Saltsburg
___	4007945	Slickville
___	4007946	Murrysville
___	4007947	Braddock
___	4007948	Pittsburgh East
___	4007951	Brush Valley
___	4007952	Indiana
___	4007953	McIntyre
___	4007954	Avonmore
___	4007955	Vandergrift
___	4007956	New Kensington East
___	4007957	New Kensington West
___	4007958	Glenshaw
___	4007961	Clymer
___	4007962	Ernest
___	4007963	Elderton
___	4007964	Whitesburg
___	4007965	Leechburg
___	4007966	Freeport
___	4007967	Curtisville
___	4007968	Valencia
___	4007971	Marion Center
___	4007972	Plumville
___	4007973	Rural Valley
___	4007974	Mosgrove
___	4007975	Kittanning
___	4007976	Worthington
___	4007977	Saxonburg
___	4007978	Butler
___	4007981	Valier
___	4007982	Dayton
___	4007983	Distant
___	4007984	Templeton
___	4007985	East Brady
___	4007986	Chicora
___	4007987	East Butler
___	4007988	Mt Chestnut

	Quad No.	Quad Name
___	4008011	Ellsworth
___	4008012	Amity
___	4008013	Prosperity
___	4008014	Claysville
___	4008015	Valley Grove
___	4008021	Hackett
___	4008022	Washington East
___	4008023	Washington West
___	4008024	West Middletown
___	4008025	Bethany
___	4008031	Bridgeville
___	4008032	Cannonsburg
___	4008033	Midway
___	4008034	Avella
___	4008035	Steubenville East
___	4008041	Pittsburgh West
___	4008042	Oakdale
___	4008043	Clinton
___	4008044	Burgettstown
___	4008045	Weirton
___	4008051	Emsworth
___	4008052	Ambridge
___	4008053	Aliquippa
___	4008054	Hookstown
___	4008055	East Liverpool South
___	4008061	Mars
___	4008062	Baden
___	4008063	Beaver
___	4008064	Midland
___	4008065	East Liverpool North
___	4008071	Evans City
___	4008072	Zelienople
___	4008073	Beaver Falls
___	4008074	New Galilee
___	4008075	East Palestine
___	4008081	Prospect
___	4008082	Portersville
___	4008083	New Castle South
___	4008084	Bessemer
___	4008085	New Middletown
___	4107418	Flatbrookville
___	4107427	Culvers Gap
___	4107428	Lake Maskenozha
___	4107436	Port Jervis South
___	4107437	Milford
___	4107438	Edgemere
___	4107446	Port Jervis North
___	4107447	Pond Eddy
___	4107448	Shohola
___	4107458	Eldred
___	4107511	Bushkill
___	4107512	East Stroudsburg
___	4107513	Mount Pocono

	Quad No.	Quad Name
___	4107514	Pocono Pines
___	4107515	Blakeslee
___	4107516	Hickory Run
___	4107517	White Haven
___	4107518	Freeland
___	4107521	Twelve Mile Pond
___	4107522	Skytop
___	4107523	Buck Hill Falls
___	4107524	Tobyhanna
___	4107525	Thornhurst
___	4107526	Pleasant View Summit
___	4107527	Wilkes-Barre East
___	4107528	Wilkes-Barre West
___	4107531	Pecks Pond
___	4107532	Promised Land
___	4107533	Newfoundland
___	4107534	Sterling
___	4107535	Moscow
___	4107536	Avoca
___	4107537	Pittston
___	4107538	Kingston
___	4107541	Rowland
___	4107542	Hawley
___	4107543	Lakeville
___	4107544	Lake Ariel
___	4107545	Olyphant
___	4107546	Scranton
___	4107547	Ransom
___	4107548	Center Moreland
___	4107551	Narrowsburg
___	4107552	White Mills
___	4107553	Honesdale
___	4107554	Waymart
___	4107555	Carbondale
___	4107556	Dalton
___	4107557	Factoryville
___	4107558	Tunkhannock
___	4107561	Damascus
___	4107562	Galilee
___	4107563	Aldenville
___	4107564	Forest City
___	4107565	Clifford
___	4107566	Lenoxville
___	4107567	Hop Bottom
___	4107568	Springville
___	4107571	Callicoon
___	4107572	Long Eddy
___	4107573	Lake Como
___	4107574	Orson
___	4107575	Thompson
___	4107576	Harford
___	4107577	Montrose East
___	4107578	Montrose West
___	4107583	Hancock
___	4107584	Starrucca

	Quad No.	Quad Name
___	4107585	Susquehanna
___	4107586	Great Bend
___	4107587	Franklin Forks
___	4107588	Laurel Lake
___	4107611	Sybertsville
___	4107612	Berwick
___	4107613	Mifflinville
___	4107614	Bloomsburg
___	4107615	Millville
___	4107616	Washingtonville
___	4107617	Milton
___	4107618	Allenwood
___	4107621	Nanticoke
___	4107622	Shickshinny
___	4107623	Stillwater
___	4107624	Benton
___	4107625	Lairdsville
___	4107626	Hughesville
___	4107627	Muncy
___	4107628	Montoursville South
___	4107631	Harveys Lake
___	4107632	Sweet Valley
___	4107633	Red Rock
___	4107634	Elk Grove
___	4107635	Sonestown
___	4107636	Picture Rocks
___	4107637	Huntersville
___	4107638	Montoursville North
___	4107641	Noxen
___	4107642	Dutch Mtn
___	4107643	Lopez
___	4107644	Laporte
___	4107645	Eagles Mere
___	4107646	Hillsgrove
___	4107647	Barbours
___	4107648	Bodines
___	4107651	Meshoppen
___	4107652	Jenningsville
___	4107653	Colley
___	4107654	Dushore
___	4107655	Overton
___	4107656	Shunk
___	4107657	Grover
___	4107658	Ralston
___	4107661	Auburn Center
___	4107662	Laceyville
___	4107663	Wyalusing
___	4107664	Monroeton
___	4107665	Powell
___	4107666	Leroy
___	4107667	Canton
___	4107668	Gleason
___	4107671	Lawton

	Quad No.	Quad Name
___	4107672	Le Raysville
___	4107673	Rome
___	4107674	Towanda
___	4107675	Ulster
___	4107676	East Troy
___	4107677	Troy
___	4107678	Roseville
___	4107681	Friendsville
___	4107682	Little Meadows
___	4107683	Windham
___	4107684	Litchfield
___	4107685	Sayre
___	4107686	Bentley Creek
___	4107687	Gillett
___	4107688	Millerton
___	4107711	Williamsport SE
___	4107712	Carroll
___	4107713	Loganton
___	4107714	Mill Hall
___	4107715	Beech Creek
___	4107716	Howard
___	4107717	Snow Shoe SE
___	4107718	Snow Shoe
___	4107721	Williamsport
___	4107722	Linden
___	4107723	Jersey Shore
___	4107724	Lock Haven
___	4107725	Farrandsville
___	4107726	Howard NW
___	4107727	Snow Shoe NE
___	4107728	Snow Shoe NW
___	4107731	Cogan Station
___	4107732	Salladasburg
___	4107733	Waterville
___	4107734	Jersey Mills
___	4107735	Glen Union
___	4107736	Renovo East
___	4107737	Renovo West
___	4107738	Keating
___	4107741	Trout Run
___	4107742	White Pine
___	4107743	English Center
___	4107744	Cammal
___	4107745	Slate Run
___	4107746	Young Womans Creek
___	4107747	Tamarack
___	4107748	Hammersley Fork
___	4107751	Liberty
___	4107752	Nauvoo
___	4107753	Morris
___	4107754	Cedar Run
___	4107755	Lee Fire Tower
___	4107756	Oleona

	Quad No.	Quad Name
___	4107757	Short Run
___	4107758	Conrad
___	4107761	Blossburg
___	4107762	Cherry Flats
___	4107763	Antrim
___	4107764	Tiadaghton
___	4107765	Marshlands
___	4107766	Galeton
___	4107767	Cherry Springs
___	4107768	Ayers Hill
___	4107771	Mansfield
___	4107772	Crooked Creek
___	4107773	Keeneyville
___	4107774	Asaph
___	4107775	Sabinsville
___	4107776	West Pike
___	4107777	Brookland
___	4107778	Sweden Valley
___	4107781	Jackson Summit
___	4107782	Tioga
___	4107783	Elkland
___	4107784	Knoxville
___	4107785	Potter Brook
___	4107786	Harrison Valley
___	4107787	Ulysses
___	4107788	Ellisburg
___	4107811	Karthaus
___	4107812	Frenchville
___	4107813	Lecontes Mills
___	4107814	Clearfield
___	4107815	Elliott Park
___	4107816	Luthersburg
___	4107817	Du Bois
___	4107818	Reynoldsville
___	4107821	Pottersdale
___	4107822	Devils Elbow
___	4107823	The Knobs
___	4107824	Huntley
___	4107825	Penfield
___	4107826	Sabula
___	4107827	Falls Creek
___	4107828	Hazen
___	4107831	Sinnemahoning
___	4107832	Driftwood
___	4107833	Dents Run
___	4107834	Weedville
___	4107835	Kersey
___	4107836	Brandy Camp
___	4107837	Carman
___	4107838	Munderf
___	4107841	First Fork
___	4107842	Cameron
___	4107843	West Creek

	Quad No.	Quad Name
___	4107844	Rathbun
___	4107845	St. Marys
___	4107846	Ridgway
___	4107847	Portland Mills
___	4107848	Hallton
___	4107851	Wharton
___	4107852	Emporium
___	4107853	Rich Valley
___	4107854	Wildwood Fire Tower
___	4107855	Glen Hazel
___	4107856	Wilcox
___	4107857	James City
___	4107858	Russel City
___	4107861	Austin
___	4107862	Keating Summit
___	4107863	Norwich
___	4107864	Crosby
___	4107865	Hazel Hurst
___	4107866	Mt Jewett
___	4107867	Kane
___	4107868	Ludlow
___	4107871	Coudersport
___	4107872	Roulette
___	4107873	Port Allegany
___	4107874	Smethport
___	4107875	Cyclone
___	4107876	Lewis Run
___	4107877	Westline
___	4107878	Cornplanter Bridge
___	4107881	Oswayo
___	4107882	Sh nglehouse
___	4107883	Bullis Mills
___	4107884	Eldred
___	4107885	Derrick City
___	4107886	Bradford
___	4107887	Stickney
___	4107888	Cornplanter Run
___	4107911	Coolspring
___	4107912	Summerville
___	4107913	New Bethlehem
___	4107914	Sligo
___	4107915	Rimersburg
___	4107916	Parker
___	4107917	Hilliards
___	4107918	West Sunbury
___	4107921	Brookville
___	4107922	Corsica
___	4107923	Strattanville
___	4107924	Clarion
___	4107925	Knox
___	4107926	Emlenton
___	4107927	Eau Claire
___	4107928	Barkeyville

	Quad No.	Quad Name
___	4107931	Sigel
___	4107932	Cooksburg
___	4107933	Lucinda
___	4107934	Fryburg
___	4107935	Kossuth
___	4107936	Cranberry
___	4107937	Kennerdell
___	4107938	Polk
___	4107941	Marienville East
___	4107942	Marienville West
___	4107943	Tylersburg
___	4107944	Tionesta
___	4107945	President
___	4107946	Oil City
___	4107947	Franklin
___	4107948	Utica
___	4107951	Lynch
___	4107952	Mayburg
___	4107953	Kellettville
___	4107954	West Hickory
___	4107955	Pleasantville
___	4107956	Titusville South
___	4107957	Dempseytown
___	4107958	Sugar Lake
___	4107961	Sheffield
___	4107962	Cherry Grove
___	4107963	Cobham
___	4107964	Tidioute
___	4107965	Grand Valley
___	4107966	Titusville North
___	4107967	Centerville
___	4107968	Townville
___	4107971	Clarendon
___	4107972	Warren
___	4107973	Youngsville
___	4107974	Pittsfield
___	4107975	Spring Creek
___	4107976	Spartansburg
___	4107977	Lake Canadohta
___	4107978	Millers Station
___	4107981	Scandia
___	4107982	Russell
___	4107983	Sugar Grove
___	4107984	Lottsville
___	4107985	Columbus
___	4107986	Corry
___	4107987	Union City
___	4107988	Waterford
___	4108011	Slippery Rock
___	4108012	Harlansburg
___	4108013	New Castle North
___	4108014	Edinburg
___	4108015	Campbell

	Quad No.	Quad Name
___	4108021	Grove City
___	4108022	Mercer
___	4108023	Greenfield
___	4108024	Sharon East
___	4108025	Sharon West
___	4108031	Sandy Lake
___	4108032	Jackson Center
___	4108033	Fredonia
___	4108034	Sharpsville
___	4108035	Orangeville
___	4108041	New Lebanon
___	4108042	Hadley
___	4108043	Greenville East
___	4108044	Greenville West
___	4108045	Kinsman
___	4108051	Cochranton
___	4108052	Geneva
___	4108053	Conneaut Lake
___	4108054	Hartstown
___	4108055	Andover
___	4108061	Blooming Valley
___	4108062	Meadville
___	4108063	Harmonsburg
___	4108064	Linesville
___	4108065	Leon
___	4108071	Cambridge Springs
___	4108072	Edinboro South
___	4108073	Conneautville
___	4108074	Beaver Center
___	4108075	Pierpoint
___	4108081	Cambridge Springs NE
___	4108082	Edinboro North
___	4108083	Albion
___	4108084	East Springfield
___	4108085	Conneaut
___	4207615	Waverly
___	4207616	Wellsburg
___	4207617	Elmira
___	4207618	Seeley Creek
___	4207711	Caton
___	4207811	Allentown
___	4207812	Bolivar
___	4207917	Wattsburg
___	4207918	Hammett
___	4207927	North East
___	4207928	Harborcreek
___	4208011	Erie South
___	4208012	Swanville
___	4208013	Fairview
___	4208014	Fairview SW
___	4208021	Erie North

I. Distribution by Latitude and Longitude

NOTE: Complete this section for 1) special status species, including federal and/or state designations of endangered, threatened, species of special concern, status undetermined, and status indeterminate, and 2) species with a limited resident distribution in Pennsylvania (i.e., species occurring in less than 5% of Pennsylvania counties).

This section is divided into two data entry parts - in part one point locations should be entered and/or the second part enter a series of latitude/longitude points that enclose an area or polygon in which the species occurs.

Latitude and longitude are to be expressed in degrees, minutes, and seconds. Examples are: latitude 03°20'10", longitude 096°36'15". Latitude and longitude should be entered in the following parts as a string separated by commas (e.g., 032010096361 5,032010095362 0, etc.).

All entries in this section should correspond with occurrence information provided in the Distribution Narrative (Section A).

1. Point Locations - this should be used for species of very limited distribution to designate occurrence (e.g. bald eagle nests, Indiana bat caves, etc.). Separate each latitude/longitude string (13 characters) with a comma.

LATITUDE	LONGITUDE		LATITUDE	LONGITUDE		LATITUDE	LONGITUDE	
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,

2. Polygon or Areal Locations - use this part to describe a more widespread species, or a species of more general occurrence (but still falling into one of the above special status designations). Most appropriately describe the boundary using a series of latitudes and longitudes that encompass a number of point locations that are clustered should fully define the species areas of occurrence in regions of the State.

POLYGON #1:

_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	

POLYGON #2:

_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	

POLYGON #3:

_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____

POLYGON #4:

_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____

POLYGON #5:

_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____

POLYGON #6:

_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____

POLYGON #7:

_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____ ,
_____ _____ , _____ _____ , _____ _____

HABITAT ASSOCIATIONS

A. Habitat Associations Narrative

Develop a complete and concise narrative describing this species habitat associations and preferences. Specifically describe the species associations and preferences with urban lands, agricultural lands, rangelands (i.e. herbaceous fields), forests, wetlands, barren lands, etc. Before developing this narrative, it may be best to review and be aware of the types of information required to complete the checklists that follow in this section and the Environmental Associations' sections. The object is to identify and describe fully the habitats in which this species occurs and those habitats, which if disturbed, would adversely impact the species. Be sure to describe any minimum area requirements, significant seasonal variations in habitat use, variations in habitat requirements which occur in different life stages and geographic areas, requirements or preferences for habitat interspersion and juxtaposition, habitat condition, etc.

Devote a section of this narrative to describing specific environmental parameters required by the species in certain habitats (e.g. temperature, pH, alkalinity, turbidity, dissolved oxygen, flow rates, velocity, salinity, soil moisture, soil depth, elevation, etc.). Again, it would be most helpful to review the Environmental Associations section prior to compiling this information.

Be certain to cite the appropriate reference codes (e.g. Ø3:435-45Ø, Ø6:14) for all information, and record the complete citations in the REFERENCE section at the back of this workbook.

B. References for Habitat Associations (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

C. General Habitat Associations

In the following checklist, check all appropriate categories that correspond to the species - habitat associations (i.e., where the species normally occurs):

__ Terrestrial habitats

__ Aquatic habitats

__ Riparian habitats: Terrestrial land bordering streams, lakes, reservoirs (i.e. water): ecotone between aquatic and upland habitats that is influenced by the water regime.

D. Land Use/Land Cover Associations

In the following list, check all appropriate land use/land cover types with which the species is associated and those that are most important or preferred by the species. (Consult A LAND USE AND LAND COVER CLASSIFICATION SYSTEM FOR USE WITH REMOTE SENSOR DATA, U.S. Geological Survey, Professional Paper No. 964, 1976, for use/cover descriptions, or the land use/cover explanatory notes in the Species Workbook Supplemental Manual).

****

__ Association with specific land use/land cover types are unknown

Assoc. (A) = Species is generally associated with land use/cover type
Pref. (P) = Species demonstrates a preference for the land use/cover type specified

A	P	Code	Land Use/Land Cover Type
			URBAN OR BUILT-UP LAND
__	__	11	Residential
__	__	12	Commercial and Services
__	__	13	Industrial
__	__	14	Transportation, Communications, and Utilities
__	__	15	Industrial and Commercial Complexes
__	__	16	Mixed Urban or Built-up Land
			AGRICULTURAL LAND
__	__	21	Cropland and Pasture
__	__	22	Orchards, Groves, Vineyards, Nurseries & Ornamental Horticulture
__	__	23	Confined Feeding Operations
			RANGELAND
__	__	31	Herbaceous Rangeland
__	__	32	Shrub and Brush Rangeland
__	__	33	Mixed Rangeland
			FOREST LAND
__	__	41	Deciduous Forest Land
__	__	42	Evergreen Forest Land
__	__	43	Mixed Forest Land
			WATER
__	__	51	Streams and Canals
__	__	52	Lakes
__	__	53	Reservoirs
__	__	54	Bays and Estuaries
			WETLAND
__	__	61	Forested Wetland
__	__	62	Nonforested Wetland
			BARREN LAND
__	__	72	Beaches
__	__	73	Sandy Areas other than Beaches
__	__	74	Bare Exposed Rock
__	__	75	Strip Mines, Quarries, and Gravel Pits
__	__	76	Transitional Areas
__	__	77	Mixed Barren Land

E. Forest Habitat Associations

In the table that follows, check all appropriate forest types/size classes with which the species is associated. Use the Species Workbook Supplemental Manual for forest cover type descriptions. If available species information fails to identify a specific size class association, check all size classes.

Size class definitions are as follows:

A. Grass/Forb = understory is in grasses and forbs or other vegetation, no regeneration of tree species

B. Seedling/Shrub = understory predominately trees less than 1" diameter

C. Sapling = young stand of trees (trees 1" to 5" dbh)

D. Pole = young stand of trees [trees 5" - 9" dbh (softwoods) or 11" dbh (hardwoods)]

E. Mature = mature stand of trees [trees ≥ 9" dbh (softwoods) or 11" dbh (hardwoods), but not "old growth"]

F. Old Growth = old growth stand of trees (trees which are rotting or dying due to old age)

****

__ Association with specific forest types are unknown

__ Species does not associate with forests

FOREST GROUP & TYPE	CODE	ALL SIZE CLASSES	GRASS/FORB	SEEDLING/SHRUB	SAPLING	POLE	MATURE	OLD GROWTH
White/Red/Jack Pine Group	10							
Red Pine	02	__	__	__	__	__	__	__
White Pine	03	__	__	__	__	__	__	__
White Pine/Hemlock	04	__	__	__	__	__	__	__
Hemlock	05	__	__	__	__	__	__	__
Scotch Pine	06	__	__	__	__	__	__	__
Spruce/Fir Group	20							
Red Spruce/Balsam Fir	13	__	__	__	__	__	__	__
Tamarack (eastern larch)	15	__	__	__	__	__	__	__
White Spruce	16	__	__	__	__	__	__	__
Norway Spruce	17	__	__	__	__	__	__	__
Larch	18	__	__	__	__	__	__	__
Loblolly and Shortleaf Pine Group	30							
Virginia Pine	33	__	__	__	__	__	__	__
Eastern Redcedar	35	__	__	__	__	__	__	__
Pitch Pine	38	__	__	__	__	__	__	__

FOREST GROUP & TYPE	CODE	ALL SIZE CLASSES	GRASS/FORB	SEEDLING/SHRUB	SAPLING	POLE	MATURE	OLD GROWTH
Oak/Pine Group	40							
White Pine/Northern Red Oak/ White Ash	41							
Eastern Redcedar/Hardwood	42							
Virginia Pine/Southern Red Oak	45							
Oak/Hickory Group	50							
Post, Black, or Bear Oak	51							
Chestnut Oak	52							
White Oak/Red Oak/Hickory	53							
White Oak	54							
Northern Red Oak	55							
Yellow Poplar/White Oak/Northern Red Oak	56							
Black Locust	57							
Black Walnut	83							
Yellow Poplar	94							
Central Hardwood Reverting Field	95							
Scarlet Oak	96							
Sassafras/Persimmon	97							
Red Maple/Central Hardwoods	29							
Mixed Central Hardwoods	59							
Elm/Ash/Red Maple Group	70							
Black Ash/American Elm/Red Maple	71							
River Birch/Sycamore	72							
Cottonwood	73							
Willow	74							
Maple/Beech/Birch Group	80							
Sugar Maple/Beech/Yellow Birch	81							
Black Cherry	82							
Red Maple/Northern Hardwoods	84							
Northern Hardwood Reverting Field	88							
Mixed Northern Hardwoods	89							
Aspen/Birch Group	90							
Aspen	91							
Paper Birch	92							
Gray Birch	93							

F. Timber Class Association

Check the box(es) below that represent the timber inventory size classes with which the species is associated.

__ Species Association with specific timber size classes is unknown or insufficient data to make a determination

__ Species is not associated with timber/forest land

****

__ All Forest Size Classes

__ Unstocked (nonstocked areas) - timberland less than 10 percent occupied with growing-stock trees

__ Seedling/Sapling - stands at least 10 percent occupied with growing stock trees of which more than half of the stocking is in saplings (1.0 - 4.9 inches dbh) and/or seedlings (<1.0 inch dbh)

__ Pole (Poletimber stands) - stands at least 10 percent occupied with growing stock trees of which half or more of this stocking is in poletimber (5.0 - 9.0 inches dbh for softwoods; 5.0 - 11.0 inches dbh for hardwoods) and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber

__ Mature (Sawtimber stands) - stands at least 10 percent occupied with growing stock trees, with half or more of total stocking in sawtimber (≥9.0 inches dbh for softwoods; ≥11.0 inches dbh for hardwoods) or poletimber trees, and with sawtimber stocking at last equal to poletimber stocking

__ Over Mature - stands at least 10 percent occupied with growing stock trees, with half or more of total stocking in over mature (decadent) or sawtimber trees, and with over mature stocking at least equal to sawtimber stocking

G. Wetland Habitat Associations

From the lists that follow, check all wetland habitat types with which the species is associated. Note that the system is hierarchical, indicate wetland associations to the subclass level in the checklists. Use the Wetland Classification Scheme information presented below and on the next two pages, and the booklet, CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES, FWS/OBS-79/31, Washington, D.C., for habitat descriptions.

****

WETLAND CLASSIFICATION SCHEME

Use of Wetland Legend: Species are related to wetlands by a series of letters and numbers (alpha numerics) with the first letter representing the system and subsequent alpha numerics representing, in sequential order, the subordinate levels of detail to modifier level. Note: The lists that are provided in this section require specifying wetland associations to the subclass level only. Special modifiers, i.e. water regime, water chemistry, and other modifiers, should be identified and referenced in the Habitat Associations Narrative.

Example

Classification of wetlands to water regime and special modifier:

System:	Estuarine
Subsystem:	Intertidal
Class:	Emergent
Subclass:	Narrow-leaved persistent
Water Regime:	Regular
Special Modifier:	Partially drained/ditched

E 2 EM 5 N d

****

__ System
__ Subsystem

SYSTEMS AND SUBSYSTEMS

M Marine

1 Subtidal
2 Intertidal

E Estuarine

1 Subtidal
2 Intertidal

P Palustrine

Ø No Subsystem

R Riverine

1 Tidal
2 Lower Perennial
3 Upper Perennial
4 Intermittent
5 Unknown Perennial

L Lacustrine

1 Limnetic
2 Littoral

__ Class
__ Subclass

CLASSES AND SUBCLASSES

AB Aquatic Bed

1 Submergent Algal
2 Submergent Vascular
3 Submergent Moss
4 Floating-Leaved
5 Floating

BB Beach/Bar

1 Cobble/Gravel
2 Sand

EM Emergent

1 Persistent
2 Nonpersistent
3 Narrow-Leaved Nonpersistent
4 Broad-Leaved Nonpersistent
5 Narrow-Leaved Persistent
6 Broad-Leaved Persistent

FL Flat

1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
5 Vegetated Pioneer
6 Vegetated Nonpioneer

FO Forested

1 Broad-Leaved Deciduous
2 Needle-Leaved Deciduous
3 Broad-Leaved Evergreen
4 Needle-Leaved Evergreen
5 Dead
6 Deciduous
7 Evergreen

OW Open Water/ Unknown Bottom

RB Rock Bottom

1 Bedrock
2 Boulder

RS Rocky Shore

1 Bedrock
2 Boulder
3 Vegetated Nonpioneer

SB Streambed

1 Cobble/Gravel
2 Sand
3 Mud
4 Organic

SS Scrub/Shrub

1 Broad-Leaved Deciduous
2 Needle-Leaved Deciduous
3 Broad-Leaved Evergreen
4 Needle-Leaved Evergreen
5 Dead
6 Decidous
7 Evergreen

UB Unconsolidated Bottom

1 Cobble/Gravel
2 Sand
3 Mud
4 Organic

US Unconsolidated shore

1 Cobble/Gravel
2 Sand
3 Mud
4 Organic
5 Vegetated

MODIFIERS TO WETLAND CLASSIFICATION

WATER REGIME MODIFIERS

Nontidal

A Temporary
B Saturated
C Seasonal
D Seasonal/Well-Drained
E Seasonal/Saturated
F Semipermanent
G Intermittently Exposed
H Permanent
J Intermittently Flooded

Nontidal Combined

Z Intermittently Exposed/ Permanent (G,H above)
W Intermittently Flooded/ Temporary (A,J above)
Y Saturated Semipermanent/ All Seasonals (B,C,D,E,F above)

Nontidal and Tidal

U Unknown
K Artificial

Tidal

L Subtidal
M Irregularly Exposed
N Regular
P Irregular
R Seasonal
S Temporary
T Semipermanent
V Permanent

WATER CHEMISTRY MODIFIERS

Coastal Halinity

1 Hyperhaline
2 Euhaline
3 Mixohaline (Brackish)
4 Polyhaline
5 Mesohaline
6 Oligohaline
Ø Fresh

Inland Salinity

7 Hypersaline
8 Eusaline
9 Mixosaline
Ø Fresh

pH Freshwater

a Acid
t Circumneutral
l Alkaline

OTHER MODIFIERS

Special

b Beaver
d Partially Drained/Ditched
f Farmed
h Diked/Impounded
r Artificial
s Spoil
x Excavated

Soils

g Organic
n Mineral

****

__ Association with specific wetland types are unknown
__ Species is not associated with wetlands

ESTUARINE HABITATS

__ E....

__ E1...

__ E1AB.
- __ E1AB1
- __ E1AB2
- __ E1AB4
- __ E1AB5

__ E10WØ
- __ E10WØ

__ E1RB.
- __ E1RB1
- __ E1RB2

__ E1UB.
- __ E1UB1
- __ E1UB2
- __ E1UB3
- __ E1UB4

__ E2...

__ E2AB.
- __ E2AB1
- __ E2AB2

__ E2BB.
- __ E2BB1
- __ E2BB2

__ E2EM.
- __ E2EM1
- __ E2EM2
- __ E2EM3
- __ E2EM4
- __ E2EM5
- __ E2EM6

__ E2FL.
- __ E2FL1
- __ E2FL2
- __ E2FL3
- __ E2FL4
- __ E2FL5
- __ E2FL6

__ E2FO.
- __ E2FO1
- __ E2FO3
- __ E2FO4
- __ E2FO5
- __ E2FO6
- __ E2FO7

__ E2RS.
- __ E2RS1
- __ E2RS2
- __ E2RS3

__ E2SB.
- __ E2SB1
- __ E2SB2
- __ E2SB3
- __ E2SB4

__ E2SS.
- __ E2SS1
- __ E2SS3
- __ E2SS4
- __ E2SS5
- __ E2SS6
- __ E2SS7

__ E2US.
- __ E2US1
- __ E2US2
- __ E2US3
- __ E2US4
- __ E2US5

PALUSTRINE HABITATS

- __ P ....
  - __ PØ...
    - __ PØAB.
      - __ PØAB1
      - __ PØAB2
      - __ PØAB3
      - __ PØAB4
      - __ PØAB5
    - __ PØEM.
      - __ PØEM1
      - __ PØEM2
      - __ PØEM3
      - __ PØEM4
      - __ PØEM5
      - __ PØ3M6
    - __ PØFL.
      - __ PØFL1
      - __ PØFL2
      - __ PØFL3
      - __ PØFL4
      - __ PØFL5
      - __ PØFL6
    - __ PØFO.
      - __ PØFO1
      - __ PØFO2
      - __ PØFO3
      - __ PØFO4
      - __ PØFO5
      - __ PØFO6
      - __ PØFO7
    - __ PØOWØ
      - __ PØOWØ
    - __ PØRB.
      - __ PØRB1
      - __ PØRB2
    - __ PØSS.
      - __ PØSS1
      - __ PØSS2
      - __ PØSS3
      - __ PØSS4
      - __ PØSS5
      - __ PØSS6
      - __ PØSS7
    - __ PØUB.
      - __ PØUB1
      - __ PØUB2
      - __ PØUB3
      - __ PØUB4
    - __ PØUS.
      - __ PØUS1
      - __ PØUS2
      - __ PØUS3
      - __ PØUS4
      - __ PØUS5

LACUSTRINE HABITATS

- __ L....
  - __ L1...
    - __ L1AB.
      - __ L1AB1
      - __ L1AB2
      - __ L1AB3
      - __ L1AB4
      - __ L1AB5
    - __ L1OWØ
      - __ L1OWØ
    - __ L1RB.
      - __ L1RB1
      - __ L1RB2
    - __ L1UB.
      - __ L1UB1
      - __ L1UB2
      - __ L1UB3
      - __ L1UB4
  - __ L2...
    - __ L2AB.
      - __ L2AB1
      - __ L2AB2
      - __ L2AB3
      - __ L2AB4
      - __ L2AB5
    - __ L2BB.
      - __ L2BB1
      - __ L2BB2
    - __ L2EM.
      - __ L2EM2
      - __ L2EM3
      - __ L2EM4
    - __ L2FL.
      - __ L2FL1
      - __ L2FL2
      - __ L2FL3
      - __ L2FL4
      - __ L2FL5
      - __ L2FL6
    - __ L2OWØ
      - __ L2OWØ
    - __ L2RB.
      - __ L2RB1
      - __ L2RB2
    - __ L2RS.
      - __ L2RS1
      - __ L2RS2
    - __ L2UB.
      - __ L2UB1
      - __ L2UB2
      - __ L2UB3
      - __ L2UB4
    - __ L2US.
      - __ L2US1
      - __ L2US2
      - __ L2US3
      - __ L2US4
      - __ L2US5

RIVERINE HABITATS

__ R....

__ R1...

__ R1AB.
- __ R1AB1
- __ R1AB2
- __ R1AB3
- __ R1AB4
- __ R1AB5

__ R1BB.
- __ R1BB1
- __ R1BB2

__ R1EM.
- __ R1EM2
- __ R1EM3
- __ R1EM4

__ R1FL.
- __ R1FL1
- __ R1FL2
- __ R1FL3
- __ R1FL4
- __ R1FL5
- __ R1FL6

__ R1OWØ
- __ R1OWØ

__ R1RB.
- __ R1RB1
- __ RLRB2

__ R1RS.
- __ R1RS1
- __ R1RS2

__ R1UB.
- __ R1UB1
- __ R1UB2
- __ R1UB3
- __ R1UB4

__ R1US.
- __ R1US1
- __ R1US2
- __ R1US3
- __ R1US4
- __ R1US5

__ R2...

__ R2AB.
- __ R2AB1
- __ R2AB2
- __ R2AB3
- __ R2AB4
- __ R2AB5

__ R2BB.
- __ R2BB1
- __ R2BB2

__ R2EM.
- __ R2EM2
- __ R2EM3
- __ R2EM4

__ R2FL.
- __ R2FL1
- __ R2FL2
- __ R2FL3
- __ R2FL4
- __ R2FL5
- __ R2FL6

__ R2OWØ
- __ R2OWØ

__ R2RB.
- __ R2RB1
- __ R2RB2

__ R2RS.
- __ R2RS1
- __ R2RS2

__ R2UB.
- __ R2UB1
- __ R2UB2
- __ R2UB3
- __ R2UB4

__ R2US.
- __ R2US1
- __ R2US2
- __ R2US3
- __ R2US4
- __ R2US5

__ R3...

__ R3AB.
- __ R3AB1
- __ R3AB2
- __ R3AB3
- __ R3AB4
- __ R3AB5

__ R3BB.
- __ R3BB1
- __ R3BB2

__ R3FL.
- __ R3FL1
- __ R3FL2
- __ R3FL3
- __ R3FL4
- __ R3FL5
- __ R3FL6

__ R3OWØ
- __ R3OWØ

__ R3RB.
- __ R3RB1
- __ R3RB2

__ R3RS.
- __ R3RS1
- __ R3RS2

__ R3UB.
- __ R3UB1
- __ R3UB2
- __ R3UB3
- __ R3UB4

__ R3US.
- __ R3US1
- __ R3US2
- __ R3US3
- __ R3US4
- __ R3US5

__ R4...

__ R4OWØ
- __ R4OWØ

__ R4SB.
- __ R4SB1
- __ R4SB2
- __ R4SB3
- __ R4SB4

NICHE/ENVIRONMENTAL REQUIREMENTS

Use the following lists to describe 1) the range of environmental conditions in which the species occurs regardless of life stage/activity (even though the conditions may represent suboptimal conditions); and 2) the specific limiting environmental conditions that are necessary for the species to survive and complete its life cycle for the species as a whole and by activity/life stage. Keep in mind that this section is an extension of Habitat Associations and any explanations of entries in this section and references should be cited in the Habitat Associations narrative.

Apply the following instruction in deciding whether an environmental parameter is necessary - an environmental parameter is necessary if a change or modification of the parameter or condition has the potential for negatively impacting the species survival (and the species population, behavior, or distribution).

Using the lists on the pages that follow, check those parameter values that represent conditions in which the species will occur (column labeled Environmental Associations) and check those values that represent conditions that are necessary for the species to survive and complete its life cycle (column labeled Limiting Factors). Note: A species may be associated with many parameters and values, but have limiting factors identified for only a few parameters and values. For every limiting factor, check the activity/life stage for which the factor is important. To illustrate, a fish species x will be found in a variety of aquatic habitats with water temperatures ranging from 4°C to 25°C on a seasonal basis; however, breeding adults require water temperatures between 11°C and 14.5°C to spawn and the eggs must have water temperatures of 16°C to 18°C to hatch. On the first page of the checklist for the parameter "Water Temperature" for the fish just described, the following checks would be placed: The Environmental Associations column would have checks placed across from second order values B and C (water temperatures between 0°C to 30°C); the Limiting Factors column would have checks across from second order values B and C, too; the Egg column would receive a check for the value B; and the Breeding Adult column would receive a check for the value C.

Keep in mind that these checklists are designed to summarize specific information recorded in the narrative sections of the workbook into standard keywords. These keyword values will permit rapid retrievals from the database, but precise values and explanations should be recorded in the narrative. Remember, the narrative should function as a source for these checklists.

Different life stages will be completed in the following pages depending on taxonomic group. The five life stages - egg, larva, pupa, juvenile, and adult - are defined for the following taxonomic groups:

	Taxonomic Group	Egg	Larva	Pupa	Juvenile	Adult
01	Fishes	x	x		x	x
02	Amphibians	x	x			x
03	Reptiles	x			x	x
04	Birds	x			x	x
05	Mammals				x	x
06	Aquatic Molluscs	x	x			x
07	Aquatic Crustaceans	x	x		x	x
08	Aquatic Insects	x	x	x	x	x
09	Other Aquatic Invertebrate Taxa	x	x	x	x	x
10	Terrestrial Insects	x	x	x	x	x
11	Other Terrestrial Invertebrate Taxa	x	x	x	x	x

Environmental Parameter (First Order)		Environmental Association	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
I. Physical/Chemical													
A. AIR DESCRIPTORS													
Air Temperature	00010												A. Less than 0°C (32°F)
													B. 0° - 4° (32°F - 39°F)
													C. 4° - 15° (40°F - 59°F)
													D. 15° - 32°C (60°F - 90°F)
													E. Greater than 32°C (>90°F)
B. AQUATIC DESCRIPTORS													
Water Temperature	00070												A. Euthermal - prefers temperature greater than 30°C (86°F)
													B. Mesothermal - prefers temperature between 15°-30°C (59°F - 86°F)
													C. Oligothermal - prefers temperature between 0°-15°C (32°F - 59°F)
													D. Indifferent - enjoys a wide range in temperatures
Dissolved Oxygen	00130												A. Euoxyphilous - needs high (>9 mg/l) O_2 concentrations (saturated)
													B. Mesoxyphilous - needs moderate (6-9 mg/l) O_2 concentrations
													C. Oligoxyphilous - needs low O_2 concentrations (<6 mg/l)
													D. Anoxyphilous - enjoys a wide O_2 concentration range
Water pH	00190												A. Acidobiontic - prefers pH below 5.5
													B. Acidophilous - prefers pH below 7
													C. Neutral - prefers pH about 7
													D. Alkaliphilous - prefers pH above 7
													E. Alkalibiontic - prefers pH above 8.5
													F. Indifferent - no pH preference shown
Specific Conductance	01220												A. Less than 800
													B. 800-8000
													C. 8000-30,000
													D. 30,000-45,000
													E. 45,000-60,000
													F. Greater than 60,000

Environmental Parameter (First Order)		Environmental Associati-	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Alkalinity	01230												A. Less than 30 ppm/$CaCO_3$
													B. 30-120 ppm/$CaCO_3$
													C. 120-200 ppm/$CaCO_3$
													D. Greater than 200 ppm/$CaCO_3$
Total Hardness	01240												A. Less than 20 ppm
													B. 20-150 ppm
													C. Greater than 150 ppm
Current Velocity	00790												A. .5 fps or less
													B. .5-.99 fps
													C. 1.0-1.49 fps
													D. 1.5-1.99 fps
													E. 2.0-2.49 fps
													F. 2.5-2.99 fps
													G. 3.0-3.49 fps
													H. 3.5 - greater fps
Flow	00710												A. Rheophile - living in flowing water
													B. Helokrene - living in a marsh spring
													C. Intermittent flow - periodic standing water
													D. Small stream inhabitant - flows less than 50 cfs mean annual flow
													E. Medium size stream inhabitant - flows between 50-1,000 cfs mean annual flow
													F. Large size stream inhabitat - flows between 1,000-5,000 cfs mean annual flow
													G. River inhabitant - flows greater than 5,000 cfs mean annual flow
Gradient	00700												A. Low
													B. Moderate
													C. High

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult		Environmental Parameter (Second Order)
Water Depth	01250												A.	Less than 1 ft.
													B.	1-5 ft.
													C.	5-10 ft.
													D.	10-25 ft.
													E.	25-50 ft.
													F.	50-100 ft.
													G.	100-200 ft.
													H.	200-500 ft.
													I.	500-1000 ft.
													J.	1000-1500 ft.
													K.	Greater than 1500 ft.
Water Level	01030												A.	Permanently flooded - species preferences
													B.	Intermittently exposed
													C.	Semipermanently flooded
													D.	Seasonally flooded
													E.	Saturated
													F.	Temporarily flooded
													G.	Intermittently flooded
													H.	Artificially flooded
													I.	Reservoir tailwater
													J.	Steady-state reservoir levels
													K.	Fluctuating reservoir water levels
Substrate and Relation to Substrate	00670												A.	Epibenthic - occurring on, but not penetrating the substrate and submerged objects
													B.	Embenthic - occurring in, penetrating, the substrate
													C.	Epipelic - occurring on (or in) mud and silt
													D.	Episabulic - occurring on (or in) sand
													E.	Epilithic - occurring on (or under) rocks
													F.	Epixylous - occurring on (or into) wood
													G.	Epizooic - occurring on (or within) other animals
													H.	Epiphytic - occurring on (or within) plants
													I.	Attached - normally sessile
													J.	Unattached - normally free living, and capable of locomotion

Environmental Parameter (First Order)		Environmental Association	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Bottom Type (Aquatic)	00675												A. Mud or silt
													B. Sand
													C. Pebble
													D. Gravel
													E. Rubble
													F. Boulders
													G. Bedrock
													H. Organic debris
													I. Rooted aquatic vegetation
Percent of Substrate/ Bottom Covered (by aquatic vegetation, logs, debris, etc.)	00677												A. Less than 20%
													B. 20-40%
													C. 40-60%
													D. 60-80%
													E. Greater than 80%
Stability of Bottom	00680												A. Stable
													B. Unstable
Turbidity	00310												A. Eulichotophilous - prefers low turbidities (clear water)
													B. Mesolichtophilous - prefers generally clear water, but tolerates periodic cloudiness
													C. Polylichtophilous - enjoys a wide range of turbidities
													D. Oligilichtophilous - prefers high turbidities - murky water
Total Dissolved Solids	00370												A. Less than 5000 ppm
													B. Between 5000-10,000 ppm
													C. Greater than 10,000 ppm

Environmental Parameter (First Order)		Environmental Association	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Nutrients (Phosphorus and Nitrogen)	00430												A. Eutrophic - prefers high nutrient concentrations
													B. Mesotrophic - prefers moderate nutrient concentrations
													C. Oligotrophic - prefers low nutrient concentrations
													D. Dystrophic - prefers warm, humic rich habitat
Biodegradeable Organics	00610												A. Saprophilic - prefers polluted waters with brief periods of DO concentractions under 5 mg/l, pH 2 SUs, and temps exceeding 25°C
													B. Faculatative - wide range of tolerance to organic pollution, *pH tolerance*
													C. Saprozenous - prefers clean water habitats, can tolerate infrequent periods of low DO if pH and temps are unaltered
													D. Saprophobic - restricted to clean waters that have not been exposed to pollution
Trophic Zones	00850												A. Heterotrophic - belonging to nonself-sustaining community of organisms; needs outside energy
													B. Autotrophic - belonging to a self-nourishing community of
Trophogenic Zones	00910												A. Epilimnion inhabitant - needs well lighted, upper layer of standing water
													B. Hypolimnion inhabitant - needs dark, lower layer of standing water
Aquatic Habitat Zonation	00970												A. Littoral zone inhabitant - prefers the shallows with emergent vegetation
													B. Sublittoral zone inhabitant - prefers dimly lighted region without emergent vegetation
													C. Profundal zone inhabitant - prefers the cold, stratified region with no light and reduced oxygen levels and high pH, temperatures are uniform, sediments fine grained
													D. Pelagic - needs open water
													E. Planktonic - microscopic plants and animals

Environmental Parameter (First Order)		Environmental Association	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)	
Aquatic Vegetation	00685												A.	Pondweeds
													B.	Pickerelweed
													C.	Algae
													D.	Mosses
													E.	Widgeon Grass
													F.	Wild Celery
													G.	Bladderworts
													H.	Coontails
													I.	Cordgrass
													J.	Rushes
													K.	Sedges
													L.	Cattails
													M.	Smartweeds
													N.	Wild Rice
													O.	Alder
													P.	White Cedar
													Q.	Horsetails
													R.	Burreeds
													T.	Eelgrass
													U.	Arrow Weeds
													V.	Rice Cutgrass
													W.	Duckweeds
													Y.	Water lilies
Relative Density of Aquatic Vegetation	00690												A.	Low
													B.	Moderate
													C.	High

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Inland Wetland	01390												A. Vegetated stream banks
													B. Beaver-dammed streams
													C. Island inhabitant
													D. Bogs
													E. Embayments
													F. Sloughs, bayous
													G. Ditches
													I. Farm ponds
													J. Seasonal wet depressions
													K. Silt bottom streams
													L. Detritus bottom streams
													M. Rocky bottom stream
													N. Stream riffles
													O. Stream pool areas
													P. Stream/river weedbeds
													Q. Lake weedbeds
													R. Sink holes
													T. Wet meadows
													U. Woodland ponds
													V. Man-made impoundments
Coastal Zone	01410												A. Saltwater marsh
													B. Brackish water marsh
													C. Typha-Scirpus marsh
													D. Freshwater marsh
													E. Coastal marsh
													G. Swamp, general
													H. Cypress swamp
													I. Reefs
													J. Sandy beaches
													K. Sand bars
													L. Intercoastal waters
													M. Mud flats
													N. Dunes
													O. Hindune

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Salinity	01090												A. Polyhalobous - prefers salt concentrations above 40,000 mg/l (≈40 ppt)
													B. Euhalobous - prefers salt concentrations above 30,000 mg/l (≈30 ppt)
													C. Mesohalobous - prefers salt concentrations between 500-30,000 mg/l (≈0.5-30 ppt)
													D. Oligohalobous - prefers salt concentrations less than 500 mg/l
													E. Euryhalinous - enjoys a wide range of salt concentrations
Seeps/Springs	01210												A. Flowing - Spring
													B. Pool - Spring
C. TERRESTRIAL DESCRIPTIONS													
Soil	01280												A. Clay
													B. Silt
													C. Sand
													D. Loam
													E. Gravel
													F. Rocky
Soil Texture	01290												A. Coarse
													B. Medium
													C. Fine

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Soil Depth	01300												A. Less than 10 inches
													B. 10-20 inches
													C. 20-36 inches
													D. Greater than 36 inches
Soil Profile	01310												A. Organic Matter - Undecomposed (01 Horizon)
													B. Organic Matter - Partially Decomposed (02 Horizon)
													C. Mineral Soil/Mixed with humus (A1 Horizon)
													D. Mineral Soil/Zone of Eluviation (A2 Horizon)
													E. Transitional zone between the A and B Horizons (B1 Horizon)
													F. Zone of Illuviation with accumulation of clay, Fe, Al, (B2 Horizon)
													G. Unconsolidated Rock Material (C Horizon)
Soil Drainage	01320												A. Excessively drained (coarse soil, very porous)
													B. Well drained (medium texture soils)
													C. Moderately well drained (wet a small but significant portion of the year)
													D. Imperfectly and poorly drained (wet a significant portion of the year)
													E. Very poorly drained (water table at or near surface greater part of the year)
Soil pH	01330												A. Less than 5.0
													B. 5.0-6.0
													C. 6.0-8.0
													D. 8.0-10.0
													E. Greater than 10.0
Soil Moisture	01350												A. Wet
													B. Moist
													C. Dry

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Soil Compaction	01360												A. Easily penetrated
													B. Difficult to penetrate
													C. Not penetrable
Aspect	01270												A. North
													B. Northeast
													C. East
													D. Southeast
													E. South
													F. Southwest
													G. West
													H. Northwest
Elevation	01260												A. Below sea level
													B. 0-100 ft.
													C. 100-300 ft.
													D. 300-500 ft.
													E. 500-1,000 ft.
													F. 1,000-2,000 ft.
													G. 2,000-3,000 ft.
													H. 3,000-4,000 ft.
													I. Greater than 4,000 ft.
Slope	01340												A. Level (no slope)
													B. Less that 5%
													C. 5-10%
													D. 10-15%
													E. 15-25%
													F. Greater than 25%

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Terrestrial Features	01370												A. Burrows
													B. Talus
													C. Standing Snags
													D. Downed Logs
													E. Rock Outcrops
													F. Ridges
													G. Depressions/Sinkholes
													H. Bare Ground
													I. Leaf Nests
													J. Brush Piles/Rock Piles
													K. Cliffs/Ledges
													L. Dry Caves
													M. Wet Caves
													N. Beaches
													O. Hedgerows/Wind Breaks
													P. Fence Rows
													Q. Roadside Ditches
													R. Grassy Uncultivated Areas
													S. Large, Lone Trees (Wolf Trees)
													U. Leaf Litter
													V. Vegetation Mosaics/Edges
													W. Insect Mounds
													X. Tree Cavities
													Z. Highway Medians

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Ecotones	02000												A. Woodland/crop fields
													B. Woodland/shrub-brush field
													C. Woodland/water
													D. Woodland/herbaceous field
													E. Shrub-brush field/water
													F. Crop field/water
													G. Crop field/herbaceous field
													H. Herbaceous field/shrub-brush field
													I. Herbaceous field/water
													J. Coniferous forest/deciduous forest
													K. Woodland/barren land
													L. Woodland/wetland (not open water)
													M. Woodland/urban land
													N. Shrub-brush field/barren land
													O. Shrub-brush field/crop field
													P. Shrub-brush field/wetland (not open water)
													Q. Shrub-brush field/urban land
													R. Crop field/barren land
													S. Crop field/urban land
													T. Crop field/wetland (not open water)
													U. Woodland/herbaceous field
													V. Barren land/herbaceous field
													W. Herbaceous field/wetland (not open water)
													X. Herbaceous field/urban land
													Y. Barren land/wetland
													Z. Wetland/urban land
Forest Ecotones	01690												A. Clearcut (opening)/seedling-sapling stage
													B. Clearcut (opening)/pole stage
													C. Clearcut (opening)/mature stage
													D. Seedling-sapling/pole stage
													E. Seedling-sapling/mature stage
													F. Pole/mature stage
Terrestrial Vertical Diversity	01750												A. Subsurface layer
													B. Surface layer (bare soil, organic layer and leaf litter)
													C. Herbaceous layer
													D. Shrub layer
													E. Understory tree layer (canopy)
													F. Overstory tree layer (canopy)

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Nest Sites	01990												A. Cavities in live trees
													B. Cavities in dead trees
													C. Underground burrow (Upland)
													D. Underwater burrow
													E. Riparian burrow
													F. Depressions
													G. Rock outcrops
													H. Bare ground/very sparce vegetation
													I. Emergent vegetation over/near water
													J. Ledges
													K. Caves
													L. Sand beaches/pebble beach
													M. Leaf nests in live trees
													N. Twig nests in live trees
													O. Leaf litter
													P. Hedgerows
													Q. Downed logs
													R. Grassy uncultivated areas/hay fields
													T. Roadside ditches
													U. Brush piles
													V. Shrubs/shrubbery trees
													W. Trees
Size of Forest Clearings/Openings	02010												A. Less than 1/2 acre
													B. 1/2-1 acre
													C. 1-5 acres
													D. 5-20 acres
													E. 20-40 acres
													F. Greater than 40 acres
Size of Continuous Forested Stand	02020												A. Less than 10 acres
													B. 10-19 acres
													C. 20-49 acres
													D. 50-99 acres
													E. 100-499 acres
													F. 500-5000 acres
													G. 5000-10,000 acres
													H. Greater than 10,000 acres

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Distance to Forest Opening	02030												A. Less than 500 ft. (.1 miles)
													B. 500-2640 ft. (.1-.5 miles)
													C. Greater than 2640 ft. (.5 miles)
Perch Sites Location	02050												A. Near permanent water
													B. Overhanging permanent water
Percent Overstory Canopy Closure	02060												A. Greater than 70% closure
													B. 40-70% closure
													C. Less than 40% closure
Average Height of Overstory Trees	02070												A. Less than 20 ft.
													B. 20-40 ft.
													C. 40-80 ft.
													D. Greater than 80 ft.
Average DBH of Overstory Trees	02080												A. Less than 4 inches
													B. 4-11 inches
													C. 12-18 inches
													D. Greater than 18 inches
Percent Shrub Crown Cover	03010												A. Less than 10%
													B. 10-25% cover
													C. 25-50% cover
													D. 50-75% cover
													E. Greater than 75%
Average Height of Shrub Cover	03020												A. Less than 3 ft.
													B. 3-6 ft.
													C. 6-12 ft.
													D. Greater than 12 ft.

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Percent Herbaceous Ground Cover (Spring/Early Summer)	03040												A. Less than 10%
													B. 10-25%
													C. 25-50%
													D. 50-75%
													E. Greater than 75%
Average Height of Herbaceous Cover (Summer)	03050												A. Less than 4 inches
													B. 4-8 inches
													C. 8-12 inches
													D. 12-24 inches
													E. 24-36 inches
													F. Greater than 36 inches
Agricultural Types	03100												A. Pastureland
													B. Winter grains (barley, wheat, rye)
													C. Spring grains (oats, corn, buckwheat, soybeans)
													D. Orchards (fruits - apple, pear, peach, etc.)
													E. Vineyards
													F. Haylands
													G. Wheat
													H. Rye
													I. Oats
													J. Barley
													K. Soybeans
													L. Corn
													M. Potatoes
													N. Tobacco
													O. Vegetable crops (beans, tomatoes, cabbage, etc.)
													P. Cherry
													Q. Apples
													R. Pears
													T. Peaches

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Vegetation Successional	02830												A. Abandoned fields
													B. Sand dune
													C. Stable forest
													D. Subclimax forest
													E. Climax forest
													F. Pond pioneer aquatic vegetation
													G. Filled pond
													H. Bare rock
													I. Pioneer community
													J. Stable prairie/grassland
													K. Subclimax grassland
													L. Climax grassland
													M. Vegetation-choked pond
Distance to Perch Sites (forbs, trees, fence, telephone pole, etc.)	02840												A. Less than 100 ft.
													B. 100-300 ft.
													C. 300-600 ft.
													D. 600-1320 ft.
													E. 1320-2640 ft. (1/4-1/2 mile)
													F. Greater than 1/2 mile
Percent Coniferous Trees in Mixed Forest	02850												A. Less than 5%
													B. 5-10%
													C. 10-25%
													D. Greater than 25%
Number of Snags (Dead Trees) per acre	02860												A. 1 or less
													B. 2
													C. 3
													D. 4
													E. Greater than 4

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Percent of Overstory Canopy Trees in Deciduous Species	02870												A. Less than 10%
													B. 10-25%
													C. 25-50%
													D. 50-75%
													E. Greater than 75%
Shrubs	02120												A. Spicebush
													B. Serviceberry
													C. Mountain Maple/Striped Maple
													D. Dogwood Species
													E. Sumacs
													F. Hazelnut
													G. Elderberry (American elder)
													H. Chokeberry
													I. Viburnum Species
													J. Wintergreen
													K. Winterberry
													L. Juniper
													M. Mountain-ash
													N. Buttonbush
													O. Buckthorn
													P. Rubus (blackberry, raspberry, dewberry)
													Q. Multiflora Rose
													R. Vaccinium Species (blueberry, deerberry)
													T. Alder
													U. Huckleberry
													V. Barberry
													W. Rhododendren
													Y. Laurel

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
More Shrubs	02130												
													A. Poison ivy
													B. Hawthorn
													C. Witch hazel
													D. Tartarian honeysuckle
													E. Autumn olive/Russian olive
													F. Rugosa rose
													G. Willow species
													H. Amur honeysuckle
													I. Sweet bay
													J. Sweet fern
Vines	02170												
													A. Japanese honeysuckle
													B. Trumpet creeper
													E. Poison ivy
													F. Virginia creeper
													G. Grape
													H. Greenbrier
													I. Bittersweet
													J. Kudzu
													K. English ivy

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Legumes/Other Herbs	02230												A. Partridge pea
													B. Crown vetch
													C. Soybean
													D. Flatpea
													E. Sericea lespedeza
													F. Common lespedeza
													G. Kobe lespedeza
													H. Buckwheat
													I. Sunflower/Asters
													J. Birdsfoot trefoil
													K. Alfalfa
													L. Sweet clover
													M. Alsike clover
													N. Red clover
													O. Ladino clover/White clover
													P. Hairy vetch
													Q. Cowpea
													R. Bristly locust
													T. Smartweeds
													U. Crimson clover
													V. Milkweed
													W. Pokeweed
													Y. Goldenrod
													Z. Thistles

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Grasses	02290												A. Big bluestem
													B. Bermuda grass
													C. Orchard grass
													D. Japanese millet
													E. Weeping love grass
													F. Tall fescue
													G. Annual ryegrass
													H. Perennial ryegrass
													I. Switch grass
													J. Redtop
													K. Little bluestem
													L. Pearl millet
													M. Reed canary grass
													N. Timothy
													O. Foxtail millet
													P. German millet
													Q. Indian grass
													R. Grain sorghum
													T. Proso millet
More Grasses	02295												A. Smooth bromegrass
													B. Deer tongue
													C. Field bromegrass
													D. American beachgrass
													E. Quackgrass
													F. Poverty grass
													G. Panic grass
													H. Bristle grasses

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
Coniferous Trees	02720												A. Eastern redcedar (Juniperus)
													B. Norway spruce
													C. White spruce
													D. Shortleaf pine
													E. Austrian pine
													F. Red pine
													G. Pitch pine
													H. (Eastern) white pine
													I. Scotch pine
													J. Virginia pine
													K. Jack pine
													L. Hemlock
													M. Northern white cedar (Thuja)
													N. Table mountain pine
													O. Balsam fir
													P. Red spruce/Black spruce
													Q. Larch/Tamarack
Hardwood Trees	02780												A. Alder
													B. Aspen
													C. Birch
													D. Hickory
													E. Sycamore
													F. Sassafras
													G. Dogwood species
													H. White oaks group
													I. Maple, Box elder
													J. Chinese chestnut/Golden Chinquepin
													K. Ashes
													L. Russian olive/Autumn olive
													M. Black walnut/Butternut
													N. Hackberry
													O. Locust - Honey and Black
													P. Willow
													Q. Cherry species
													R. Red oaks group

Environmental Parameter (First Order)		Environmental Associations	Limiting Factors	Egg	Feeding Larva	Resting Larva	Pupa	Feeding Juvenile	Resting Juvenile	Feeding Adult	Resting Adult	Breeding Adult	Environmental Parameter (Second Order)
More Hardwood Trees	02790												A. Elm
													B. Tulip or yellow poplar
													C. Crabapple
													D. Mountain ash
													E. Beech
													F. Basswood
													G. Cottonwood
													H. American holly/hollies
													I. Blackgum
													J. Mulberry
													K. Hazel
													L. Hop hornbeam
													M. Hornbeam
													N. Bitternut Hickory
													O. Persimmon
Human Association	02890												A. Residential lawn/ornamental trees/shrubs
													B. Residential houses/chimneys/attics
													C. Farm outbuildings (barns, sheds)
													D. Abandoned buildings
													E. Farms (cropland/pastures)
													F. Farm ponds
													G. Public city parks
													H. Public residential parks
													I. State and county parks
													J. National parks/historic landmarks
													K. Wildlife refuges/sanctuaries
													L. Zoos

HABITAT EVALUATION PROCEDURES MODELS

Is there an existing model for this species? __ Yes __ No

If yes, indicate type(s) below:

__ PAMHEP
__ HEP
__ DRAFT-HEP

Habitat Evaluation Procedures Models Description (enter the model preparer, date prepared, agency affiliation, habitats and land use types for which the model applies):

ANIMAL AND PLANT ASSOCIATIONS

Use the space provided below to identify important animal and plant associations; i.e., predation, parasitism, symbiosis, commensalism, mutualism, etc. Of particular interest are dependent relationships where such relationships offer predictability of occurrence. Describe each pair or group of species in an association using their common and scientific names, with the names preceded by the type of relationship, and explain the relationship.

Be certain to follow each entry with the reference code of the reference for the source of the relationship.

References for Animal and Plant Associations (enter the reference code for all references used in compiling the entries in this section, separate each reference code with a comma):

FOOD HABITS

A. Food Habits Narrative

Develop a complete and concise description of the food items consumed by this species during its life. If available, give specific information on the foods (e.g. deer mice, frogs, and fungi, etc.) and food parts (e.g. leaves, bark, cambium, flower petals, hair, blood, etc.) consumed during each life stage of the species, i.e., the foods consumed by larva, juvenile, and adult life stages. Devote a section of the description to preferred food types and those foods essential to the species as a whole. Also, devote a paragraph or section to a discussion of seasonal variations or changes in food habits and preferences by food types and/or food parts.

Provide appropriate reference codes, including page numbers, for all information and record the complete citations in the Reference Section at the back of this workbook.

B. References for Food Habits (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

C. General Food Habit of the species (check the one value that best characterizes the food habits of the species):

__ Carnivore
__ Insectivore
__ Herbivore
__ Omnivore

D. Food Habits Checklist (check all that apply):

Check the appropriate column identifying the foods consumed by the species at the various life stages. For example, if the animal consumes bird eggs as a juvenile and adult, then you would check the Juvenile and Adult columns next to the value "Bird eggs - 2150".

The three life stages - larva, juvenile, and adult - are defined for the following taxonomic groups:

Taxonomic Group	Larva	Juvenile	Adult
Ø1 Fishes	x	x	x
Ø2 Amphibians	x		x
Ø3 Reptiles		x	x
Ø4 Birds		x	x
Ø5 Mammals		x	x
Ø6 Aquatic Molluscs	x		x
Ø7 Aquatic Crustaceans	x	x	x
Ø8 Aquatic Insects	x	x	x
Ø9 Other Aquatic Invertebrate Taxa	x	x	x
1Ø Terrestrial Insects	x	x	x
11 Other Terrestrial Invertebrate Taxa	x	x	x

[1]Larva - includes the immature life stages of aquatic insects known as nymphs, the free-swimming and glochidia stage of molluscs and the nauplius stage of crustaceans.

[2]Juvenile - a young individual (not larva) that resembles an adult, but is not sexually mature.

[3]Adult - a sexually mature individual.

Foods Consumed		GENERAL (Any life stage)	LARVA	JUVENILE	ADULT
MICRO ORGANISMS					
Bacteria	1010	—	—	—	—
Other Micro-organisms	1040	—	—	—	—
PLANTS					
Herbaceous plant parts; buds, leaves, stems, flowers	1070	—	—	—	—
Woody plant parts; buds, leaves, stems, twigs, bark	1100	—	—	—	—
Flower nectar, pollen	1130	—	—	—	—
Herbaceous fruit; berries, capsules, fruit, nuts, grain	1160	—	—	—	—
Softwood fruit; seeds of Taxaceae and Pinaceae	1190	—	—	—	—
Hardwood fruit; berries, seeds, nuts, capsules	1220	—	—	—	—
Plant sap	1250	—	—	—	—
Phytoplankton					
Diatoms	1280	—	—	—	—
Algae	1290	—	—	—	—
Other Phytoplankton	1310	—	—	—	—
Aufwuchs (attached plants and animals)	1340	—	—	—	—
Rooted aquatic plants	1370	—	—	—	—
Fungi (including sporocarps and mycelium)	1380	—	—	—	—

Foods Consumed		GENERAL (Any life stage)	LARVA	JUVENILE	ADULT
Mosses/lichens	1400	—	—	—	—
Roots/tubers/rhizomes	1430	—	—	—	—
Floating aquatic plants	1460	—	—	—	—
Detritus					
Inorganic	1490	—	—	—	—
Organic	1520	—	—	—	—
ANIMALS					
Invertebrates, Terrestrial					
Insects, adult	1580	—	—	—	—
Insects, immature	1610	—	—	—	—
Other arthropods	1640	—	—	—	—
Worms	1670	—	—	—	—
Other terrestrial invertebrates	1700	—	—	—	—
Invertebrates, Aquatic					
Insects	1730	—	—	—	—
Crustaceans	1760	—	—	—	—
Clams	1790	—	—	—	—
Snails	1820	—	—	—	—
Worms, segmented	1850	—	—	—	—
Worms, flat	1880	—	—	—	—
Coelenterates	1910	—	—	—	—
Bryozoans	1940	—	—	—	—
Zooplankton	1970	—	—	—	—
Other aquatic invertebrates	2000	—	—	—	—
Mammals, juvenile and nestlings	2030	—	—	—	—
Mammals, small	2060	—	—	—	—
Mammals, medium	2090	—	—	—	—
Mammals, large	2120	—	—	—	—

Foods Consumed		GENERAL (Any life stage)	LARVA	JUVENILE	ADULT
Bird eggs	2150	—	—	—	—
Bird nestlings	2180	—	—	—	—
Bird adults	2210	—	—	—	—
Fish eggs	2240	—	—	—	—
Fish fry	2270	—	—	—	—
Fish adults	2300	—	—	—	—
Reptile eggs	2330	—	—	—	—
Reptile juveniles	2360	—	—	—	—
Reptile adults	2390	—	—	—	—
Amphibian eggs	2420	—	—	—	—
Amphibian juveniles	2450	—	—	—	—
Amphibian adults	2480	—	—	—	—
Domestic mammals	2510	—	—	—	—
Domestic birds	2540	—	—	—	—
Carrion	2570	—	—	—	—
Feces	2600	—	—	—	—
Garbage/Trash	2630	—	—	—	—

LIFE HISTORY

In the following sections, describe the species life history. Be as complete and concise as possible.

Attempt to address most of the elements described in each section, but be concise. Be certain to follow each item of information with the reference code and page numbers that indicate the source of the information.

A. Life History Narrative

1. Physical Description

Provide a brief morphological description of the species including descriptors for size, color, etc.

2. Origin Within Pennsylvania

Describe this species origin within Pennsylvania (e.g., native, introduced, etc.). If the species is not native to Pennsylvania, include descriptive information concerning the source of animals, etc.

3. Behavior

Describe the behavior of the species including: territoriality, home range size, dispersion within natural habitat, diurnal periodicity, seasonal periodicity, movement/migration patterns within and out of Pennyslvania, dispersal, foraging strategy and sites, and interspecific and intraspecific interactions.

4. Reproductive Characteristics and Requirements

Describe the details of this species breeding behavior and characteristics, as well as reproductive site requirements, including: breeding season, mating system, duration of pair bond (if any), display site, gestation/incubation period, delayed fertilization or implantation, number of offspring per reproductive cycle, number of reproductive cycles per year, type of nesting/denning/spawning site, placement of nest/den, type of materials required for nesting/denning/spawning site, development of offspring, parental care of offspring, age at sexual maturity, minimum and maximum and breeding age, sex ratio's of clutch/litter/offspring.

5. Population Biology

Describe the population biology of this species, including: relative population trend, average annual mortality rate, survival rates, average and optimum population densities, rate of increase, sex ratio, and turnover rates.

6. Limiting Factors

Describe limiting factors that are influencing this species in including: predation, disease, food, competition, population levels, space, cover, natural catastrophes, and other factors.

B. References for Life History (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

C. Life History Checklists

Complete the following life history checklists. These checklists are used to summarize information in a consistent format with standard definitions facilitating automated data element search and retrieval.

Checklist entries should be consistent with the life history narrative. Check all categories and values in a category that apply. If a category does apply, but an appropriate value does not exist to describe the species, then write in the appropriate value or entry in the category checklist.

1. ORIGIN WITHIN PENNSYLVANIA

__ 001A Native

__ 001B Transplanted - originally native to another state, now in Pennsylvania

__ 001C Exotic - originally native to another country, now in Pennsylvania

__ 001D Feral - animals which have escaped from domestication

__ 001E Hybrid - offspring of two separate, but closely related species

__ 001F Reintroduced native - species once extirpated in Pennsylvania, now reintroduced

__ 001G Stocked - populations are artificially maintained

2. BEHAVIOR

A. Territoriality

__ 024A Defends entire breeding, feeding, and nesting territory
__ 024B Defends breeding and nesting territory
__ 024C Defends breeding territory only
__ 024D Defends nesting territory only
__ 024E Defends feeding territory only
__ 024F Non-territorial

B. Territory Size

__ 025A Less than 1/4 acre
__ 025B 1/4 - 1 acre
__ 025C 1 - 5 acres
__ 025D 5 - 20 acres
__ 025E 20 - 100 acres
__ 025F Greater than 100 acres

C. Home Range Size

__ 026A Less than 1/4 acre
__ 026B 1/4 - 1 acre
__ 026C 1 - 5 acres
__ 026D 5 - 20 acres
__ 026E 20 - 100 acres
__ 026F Greater than 100 acres

D. Dispersion

__ 027A Random
__ 027B Uniform
__ 027C Clumped

E. Periodicity

__ 028A Active at night
__ 028B Active in day
__ 028C Active at dawn and/or dusk (crepuscular)
__ 028D Cyclic day-night activity rhythms
__ 028E Most active in winter
__ 028F Most active in early spring
__ 028G Most active in late spring
__ 028H Most active in early summer
__ 028I Most active in late summer
__ 028J Most active in fall

F. Foraging Strategy

___	002A	Gleaning
___	002B	Probing
___	002C	Hovering
___	002D	Hawking
___	002E	Grazing
___	002F	Browsing
___	002G	Scavenging
___	002H	Stalking
___	002I	Filtering
___	002J	Flycatching
___	002K	Diving (Aquatic)
___	002L	Stooping
___	002M	Ambushing
___	002N	Pouncing

G. Foraging Sites

___	003A	Ground Surface
___	003B	Air
___	003C	Herbaceous vegetation
___	003D	Snags (dead/dying trees)
___	003E	Stumps
___	003F	Shrubs Cover/Canopy
___	003G	Understory tree canopy
___	003H	Branches of overstory trees
___	003I	Canopy of overstory trees
___	003J	Trunk of trees
___	003K	Tree cavities
___	003L	Rocks
___	003M	Logs
___	003N	Underground burrows
___	003O	Caves
___	003P	Cliffs/Ledges
___	003Q	Standing Water - Littoral Zone
___	003R	Standing Water - Limnetic Zone
___	003T	Standing Water - Profundal Zone
___	003U	Flowing Water - Riffles
___	003V	Flowing Water - Pools
___	003W	Flowing Water - aquatic weedbeds/vegetation

3. REPRODUCTION

A. Breeding/Spawning Season

__ 004A January
__ 004B February
__ 004C March
__ 004D April
__ 004E May
__ 004F June
__ 004G July
__ 004H August
__ 004I September
__ 004J October
__ 004K November
__ 004L December

B. Mating System (Single breeding season)

__ 006A Monogamy (male or female mates once or with only one male or female)
__ 006B Polygyny (male mates with more than one female)
__ 006C Polyandry (female mates with more than one male)
__ 006D Promiscuity (both males and females mate with more than one male or female)
__ 006E Polybrachygamy
__ 006F Colonial

C. Duration of Pair Bond

__ 007A Pair for life
__ 007B Pair for one breeding season
__ 007C No pair bond formed

D. Display Site

__ 008A Ground
__ 008B Water
__ 008C Air
__ 008D Perch
__ 008E Cavity
__ 008F Lek/Arena
__ 008G Log
__ 008H Nest

E. Gestation/Incubation Period (insemination to parturition or egg laying to hatching)

___ 015A Less than 1 day
___ 015B 1-2 days
___ 015C 3-4 days
___ 015D 5-7 days
___ 015E 1-2 weeks
___ 015F 3-4 weeks
___ 015G 1-2 months
___ 015H 3-4 months
___ 015I 5-6 months
___ 015J 7-8 months
___ 015K Greater than 8 months

F. Average Number of Offspring/Reproductive Effort

___ 016A 1
___ 016B 2
___ 016C 3-4
___ 016D 5-7
___ 016E 8-10
___ 016F 11-15
___ 016G 16-30
___ 016H 31-100
___ 016I 101-1000
___ 016J 1000-10,000
___ 016K Greater than 10,000

G. Number of Broods/Litters (Reproductive Efforts) Per Year

___ 017A One
___ 017B Two
___ 017C Three
___ 017D Greater than three

H. Spawning Site

___ 010A Standing water
___ 010B Flowing water
___ 010C Sand
___ 010D Gravel
___ 010E Rocks
___ 010F Detritus
___ 010G Mud
___ 010H Aquatic vegetation

I. Nest/Den Site

___	009A	Cavity in live tree
___	009B	Cavity in dead tree
___	009C	Primary cavity (excavates its own)
___	009D	Secondary cavity (use cavity excavated by another species)
___	009E	Under bark
___	009F	On the ground
___	009G	Underground burrow
___	009H	Hole in ground
___	009I	Depression
___	009J	Grass/Forbs
___	009K	Shrubs
___	009L	Stumps
___	009M	Trees
___	009N	Floating aquatic vegetation
___	009O	Emergent aquatic vegetation
___	009P	Rush and cattails
___	009Q	Log
___	009R	Dirt bank
___	009T	Cave
___	009U	Under rocks/rock outcrops
___	009V	Man-made structures (houses, barns, silos, etc.)
___	009W	Under leaves
___	009X	Underwater burrow
___	009Y	Ledges
___	009Z	Bare ground (no or sparce vegetation)/sand beaches
___	009AA	Upturned tree roots

J. Nest Materials

___	013A	Grasses
___	013B	Forbs
___	013C	Sticks
___	013D	Vegetative Crown
___	013E	Leaves
___	013F	Bark
___	013G	Mud
___	013H	Hair and feathers
___	013I	Rootlets
___	013J	No nest structure
___	013K	Moss
___	013L	Sand
___	013M	Gravel
___	013N	Organic debris
___	013O	Inorganic debris
___	013P	Aquatic vegetation

K. Development of Young at Birth/Hatching

___ 018A Altricial
___ 018B Precocial

L. Parental Care of Young

___ 019A Female
___ 019B Male
___ 019C Both parents
___ 019D Foster parents
___ 019E No care given young

4. POPULATION CHARACTERISTICS

A. Population Trend (Statewide)

___ 036A Increasing
___ 036B Stable
___ 036C Decreasing
___ 036D No trend-variable

B. Reasons For Population Trend

___ 032A Low Reproductive Potential
___ 032B Periphery of Range
___ 032C Overharvesting
___ 032D Disease
___ 032E Predation
___ 032F Environmental Contaminants (including heavy metals)
___ 032G Herbicides
___ 032H Pesticides/Insecticides
___ 032I Habitat Loss
___ 032J Habitat Improvement
___ 032K Range Expansion (Habitat Addition)
___ 032L Underharvesting
___ 032M High Reproduction
___ 032N Seasonal and Catastrophic Weather Conditions
___ 032O Interspecific Competition
___ 032P Intraspecific Competition

C. Population Potential Through Habitat Manipulation (MGMT)

___ 037A Increase < 10%
___ 037B Increase 10-25%
___ 037C Increase > 25%
___ 037D Decrease < 10%
___ 037E Decrease 10-25%
___ 037F Decrease > 25%

MANAGEMENT

A. Management Narrative

Develop a narrative describing those management activities or human actions that affect the species survival. Identify and describe those actions or activities that improve or are harmful to the species or its habitat. Also explain actions or activities that have a varying influence depending on how the action is implemented, and any other variations by geographic area, season, etc.

B. References for Management (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

C. Management Checklists

Check as beneficial those actions that improve a species habitat or benefit the species chance for survival. Check as harmful those actions that have an adverse impact on a species or its habitat and present a threat to the species survival. Check as many values as apply for both beneficial and harmful. Some actions may be both beneficial and harmful (make certain this situation is properly explained in the Management Narrative).

****

BENEFICIAL		HARMFUL	ACTION
___	001	___	Regulate numbers and sex of harvest
___	002	___	Prohibiting harvest of species being described
___	003	___	Transplanting wild animals
___	004	___	Stocking captive-reared domestic-strain animals
___	005	___	Stocking captive-reared wild-strain animals
___	006	___	"Put-and-Take" stocking
___	008	___	Restricting/regulating human use of habitats
___	009	___	Restricting/regulating human disturbance of populations
___	010	___	Restrict human harassment during migration
___	011	___	Restrict human disturbance during breeding or other stressful periods
___	101	___	Retention of wilderness
___	102	___	Maintaining undisturbed/undeveloped areas
___	103	___	Limit number of roads and road usage
___	104	___	Suppressing wild fire
___	110	___	Maintaining natural vegetation (native)
___	111	___	Maintaining natural ecological succession
___	112	___	Maintain early stages of succession
___	113	___	Creation and maintenance of edge situation

BENEFICIAL		HARMFUL	ACTION
___	120	___	Maintaining woodlots
___	121	___	Maintain mast producing trees
___	122	___	Creating/maintaining snags
___	123	___	Retaining dead/downed woody materials
___	124	___	Maintaining large trees for denning, nesting, or roosting
___	125	___	Creating tree cavities by mechanical excavation/ introduction of fungi/etc.
___	126	___	Retain or produce special habitat features as caves, cliffs, rims, ledges, etc.
___	127	___	Developing/maintaining greenspace (wildlife corridors)
___	128	___	Establish/maintain escape cover
___	129	___	Establishing/maintaining nesting cover
___	130	___	Providing artificial nesting sites
___	131	___	Providing ledges on highwalls
___	132	___	Providing nesting cavities in highwalls
___	133	___	Creating artificial leks or display grounds
___	134	___	Providing artificial nesting/spawning sites
___	135	___	Creating/maintaining supplemental water sources
___	136	___	Develop artificial water devices or catchments
___	137	___	Developing/maintaining water holes, ponds, potholes, etc.
___	140	___	Providing food and cover for birds in urban/ suburban areas
___	141	___	Development of food plots
___	142	___	Supplemental feeding (winter, spring, etc.)
___	150	___	Grassland burning
___	151	___	Prescribed burning of brushland habitat
___	152	___	Haying/mowing - May up to mid-June
___	153	___	Haying/mowing - After mid-June
___	154	___	Brush removal/cutting in pastures and cropland
___	155	___	Chaining vegetation to improve habitat
___	156	___	Establishment of field borders
___	157	___	Locating/constructing fences
___	158	___	Creating wind and snowbreaks
___	159	___	Developing/maintaining hedgerows
___	160	___	Creating/maintaining rock piles
___	161	___	Developing/maintaining brush or slash piles
___	162	___	Developing/maintaining ditchbank vegetation
___	163	___	Removal of hedgerows
___	164	___	Removal of stone walls

BENEFICIAL		HARMFUL	ACTION
	170		Plantings (shrubs, grasses, trees, etc.)
	171		Planting hardy, drought-resistant plants
	172		Plantings (grasses)
	173		Plantings (shrubs)
	174		Plantings along roadsides
	175		Transplanting native vegetation
	176		Transplanting nursery grown plants
	180		Using flushing devices on mowers
	181		Using taste repellents
	182		Using odor repellents
	183		Using noise or visual repellents
	200		Stream bank preservation
	201		Stream bank protection - gabion matting or riprap
	202		Developing/maintaining streambank/streamside vegetation
	203		Removal of streamside vegetation
	204		Siltation
	205		Controlling sedimentation
	206		Providing overstory shade adjacent to waterways to prevent high water temperature
	207		Maintaining dry streambeds and/or gullies
	208		Planting hedgerows along dry streambeds and/or gullies
	209		Creating artificial stream meanders
	210		Creating pools in streams
	211		Creating riffles in streams
	212		Developing/maintaining stream structures
	213		Mechanical manipulation of stream bottoms
	214		Maintaining/protecting riparian habitat
	215		Man caused fluctuations in water level during breeding season
	216		Placing artificial islands or rafts in water
	217		Creating/maintaining islands within permanent impoundments
	218		Maintain and/or create submerged brush and timber in rivers, lakes, and reservoirs
	219		Seeding aquatic plants
	220		Plantings (aquatic plants)
	221		Developing/maintaining suitable salinity
	222		Developing/maintaining suitable pH
	223		Liming and fertilizing ponds/lakes
	224		Controlling vegetation in ponds and waterways
	225		Nutrient and bacteria loading of streams

BENEFICIAL		HARMFUL	ACTION
	300		Developing/maintaining/protecting freshwater wetlands
	301		Developing/maintaining/protecting brackish wetlands
	302		Draining/excavating wetlands, including marshes with vegetatio
	303		Draining/excavating ponds and lakes
	304		Subsurface land drainage
	400		Dredging
	401		Deposition of fill
	402		Channelization
	403		Channel Realignments
	404		Channel deepening
	405		Channel widening
	406		Channel lining
	407		Creation of concrete channel
	408		Clearing/snagging
	420		Navigational improvements (i.e., dams and locks)
	421		Constructing/maintaining piers
	422		Constructing/maintaining moring piles, dolphins and buoys
	423		Constructing/maintaining bulkheads, seawalls and dikes
	424		Constructing/maintaining jetties, groins and breakwaters
	425		Dry dam construction for flood control
	426		Impoundment of waterways (flood control, recreation, etc.)
	427		Development of shallow water impoundments
	428		Increase in deep water habitats
	429		Developing fishways
	430		Establishment of elevated floodways
	431		Maintain constant water pool level
	432		Water levels seasonally fluctuating in reservoirs
	433		Entrainment/impingement from water intakes

BENEFICIAL		HARMFUL	ACTION
___	500	___	Even age timber management
___	501	___	Uneven age timber management
___	502	___	Timber harvest
___	503	___	Maintain mature hardwood forests
___	504	___	Maintain overmature hardwood and coniferous forests
___	505	___	Regeneration cuts (i.e., clearcut, selection, seed tree, shelterwood, etc.)
___	506	___	Timber harvesting - clearcutting
___	507	___	Timber harvesting - selection cuts
___	508	___	Timber harvesting - shelterwood cuts
___	509	___	Timber harvesting - seed tree cuts
___	510	___	Timber stand improvement (thinning, release cuttings, pruning)
___	511	___	Converting woodland to open land
___	512	___	Clearing/controlling understory vegetation in woodlots and forests
___	513	___	Developing/maintaining forest openings
___	514	___	Reforestation - Deciduous
___	515	___	Reforestation - Coniferous
___	516	___	Reforestation - Mixed deciduous/coniferous
___	517	___	Prescribed burning in forest habitat
___	518	___	Forest fire suppression
___	519	___	Cut-and-bend or hinge-cutting trees
___	520	___	Locating/constructing access/haul roads in forested habitat
___	521	___	Maintain haul roads/access roads in forested areas
___	522	___	Daylight cutting along roads
___	523	___	"Vista" cutting along roads and trails to open up views
___	600	___	Surface mining
___	601	___	Underground mining/deep mining
___	602	___	Dozer basin and gouging methods of surface manipulation
___	603	___	Deep chizelng
___	604	___	Creating small depressions or furrows to increase water filtration
___	605	___	Stabilizing highwalls
___	606	___	Contouring to create water holes, knolls, gentle slopes and windbreaks

BENEFICIAL		HARMFUL	ACTION
	700		Intensive agricultural practices
	701		Clean farming (complete removal of residue)
	702		Conventional tillage agriculture
	703		Strip cropping
	704		Minimum tillage agriculture (strip tillage)
	705		Non-inversion tillage (deep offset disk, disk plow, chizel plow, disk harrow, spring tooth cultivator)
	706		No-till farming
	707		Retaining crop residue (over winter)
	708		Grazing
	709		Delayed grazing pastures/fields until late June or July
	710		Fencing out cattle, sheep, horses, or other livestock
	711		Overgrazing by livestock
	712		Drainage land grading (reshaping land surface to drain soil)
	713		Farm pond development
	714		Farm pond removal
	715		Irrigating
	716		Irrigating - drip or trickle
	717		Irrigating - sprinkler
	718		Development/maintenance of grassed waterways
	800		Site preparation for revegetation
	801		Planting preparatory crops (cover and green manure crop)
	802		Mowing of preparatory crop before seeding
	803		Planting seed
	804		Planting seed - broadcasting
	805		Planting seed - drilling
	806		Application of herbicides
	807		Application of insecticides
	808		Application of pesticides
	809		Application of fertilizers
	810		Mulching
	811		Mulching - organic
	812		Mulching - inorganic
	813		Mulching - frabic or mats
	814		Mulching - manure or sludge
	815		Mulching - straw or hay
	816		Mulching - native grasses
	817		Mulching - wood residues
	818		Mulching - asphalt
	819		Mulching - resin or latex emulsion

BENEFICIAL		HARMFUL	ACTION
___	900	___	Intensive recreational development
___	901	___	Rights-of-way management for wildlife
___	902	___	Creation of suburban residential areas
___	903	___	Industrial pollution
___	904	___	Locating/constructing powerlines and other rights-of-way
___	905	___	Controlling pollution (thermal, chemical, physical)
___	906	___	Controlling refuse disposal (landfills)
___	950	___	Specimen collection
___	951	___	Egg collection

REFERENCES

Record the complete citations for the references you used to complete this booklet. If the information was from verbal communications with a recognized expert, record the individual expert's name, affiliation, and address, and date of communication. Assign each citation a two (2) digit code number for use in completing the various sections of this workbook. Enter the references used in completing this booklet in sequential order. The first reference number (ØØ) is reserved for your name and address, telephone number, and affiliation - even if you are not referencing yourself in the remainder of the workbook.

Use the following convention when citing reference sources: Author name(s), date, title, source document, pages in source document. Specific questions should be referenced to the Data Base Manager or the CBE (Council of Biology Editors, 1978) Style Manual.

Code	Citation
ØØ	
Ø1	
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Code	Citation

Code	Citation

Code	Citation

Code	Citation
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Code	Citation

APPENDIX C

Sample Abstract Species Workbook

Pennsylvania Fish and Wildlife Data Base

Pennsylvania Fish and Wildlife Data Base

PENNSYLVANIA GAME COMMISSION
BUREAU OF LAND MANAGEMENT
P.O. BOX 1567
HARRISBURG, PENNSYLVANIA 17105-1567

SPECIES WORKBOOK

Species Code Number: _____

Species Common Name: _____

Species Scientific Name: _____

****

Workbook Compilers:

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

Workbook Reviewers:

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

Name: _____
Agency: _____
Address: _____
_____
_____
_____
Phone: ( ) _____

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Computer Entry:

Name: _____
Date: _____

Computer Entry Verification:

Name: _____
Date: _____

Date loaded into Data Base System: _____

P E N N S Y L V A N I A

F I S H A N D W I L D L I F E

D A T A B A S E

S P E C I E S W O R K B O O K

Pennsylvania Game Commission
P.O. Box 1567
Harrisburg, Pennsylvania 17105-1567

Developed by

Calvin W. DuBrock
Biometrician and Data Base Coordinator
Division of Environmental Impact
Assessment and Minerals
Bureau of Land Management

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PENNSYLVANIA
FISH AND WILDLIFE
DATA BASE

SPECIES WORKBOOK

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GENERAL INSTRUCTIONS

This Species Workbook has been developed to compile information in a standard format for the Pennsylvania Fish and Wildlife Data Base. The Data Base is a computerized library of species information that is keyword searchable, providing instant access to information for 840+ animals occurring in Pennsylvania. The Data Base provides an important focus for storing and acces sing animal for Pennsylvania species. Game Commission personnel and others use this Data Base for environmental assessments, habitat evaluation and management, species management research, wildlife extension, and education.

This workbook has been designed for compiling a complete, concise profile of the distribution, status, biology, and management of the species. You will find several "narrative" and "checklist" sections in this workbook, with specific instructions accompanying each section. Most of the reference materials required to complete a section have been incorporated into the instructions and checklists. Additional materials or references that might be required to correctly complete a section, but were too voluminous or inappropriate to include in the workbook, are included in the Species Workbook Supplemental Manual.

Some of the information requested in sections of the workbook will appear to be duplicated; therefore, it is important to understand the different functions of the narrative sections and checklists.

Narratives

The narratives should be written in a flowing, readable format. They should provide quick, fully referenced, documentation to the Data Base user for environmental assessments, planning decisions, etc. The narratives should be written to stand alone; that is, even if the information is requested again in a summary checklist, it is essential that all relevant/appropriate information for the topic be included in the narrative text. An individual retrieving narrative information from the Data Base probably will not have viewed any of the checklist information.

All information presented in these narratives must be referenced. Assign each reference a numerical code (sequentially beginning with 01, based upon order of appearance in the text); then record the complete citation in the REFERENCE section of this workbook. Use these codes along with the page numbers in the citation throughout the narratives to indicate the sources for each item of information; e.g., this species deposits eggs in warm, well-drained, sandy soils (03:14, 14:350-353, 15:4-5).

When completing the narratives (and other sections requesting text), it is preferred that the information first be drafted and then typed or neatly printed in the workbook. Slash all zeros ("0") to prevent confusion with the letter "O". These steps will greatly decrease the incidence of keypunch errors when the information is entered into the computer.

Summary Checklists

The checklists are designed to summarize selected information in the narratives into standardized keywords to allow rapid retrievals from the Data Base. Many of the checklist codes/words are established standards used by other agencies. By using these standards, the checklists will permit specific retrievals from the Data Base; e.g., what species occur in palustrine wetlands? These standard keywords also are useful for crosswalking to other existing databases or mapping systems and for regional/national summaries.

Use your professional judgment to resolve cases in which there may be overlap or gray areas in the checklists. If a species relationship to a standard code/word is uncertain, it is better to indicate a positive connection rather than not indicate it and not be able to retrieve the species in situations involving that code/word. Remember, the narratives will always serve as the definitive source for describing the species.

STATUS

A. Status Narrative

Develop a narrative profile describing the current legal and use status of this species in the Commonwealth of Pennyslvania. If the species is recognized as endangered, threatened, or a species of special concern, indicate the reasons for the special status and factors that may be threatening to populations of the species. For federally listed species, include the date of listing, whether or not a federal recovery plan exists, and where designated critical habitats have been identified in Pennsylvania. Also, indicate all federal and state agencies that have executive, legislative, or other designated responsibilities for this species and describe the nature of this responsibility following the agency name. Provide appropriate reference codes including page number(s) for all information, and record the complete citation in the REFERENCE section at the back of this workbook.

Note: In developing this narrative, it may be helpful to be aware of the status categories that are included in the checklist that follows.

B. References for Status (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

_____

_____

_____

C. Status Checklist

Check all the status categories that apply to the species.

Code	Status	Definition
__ F-E	Federal Endangered	Species is officially classified by the Federal Government as being in danger of extinction throughout all or a significant part of its range. (Consult the Federal Register listing in the Species Workbook Supplemental Manual.)
__ F-T	Federal Threatened	Species is officially classified by the Federal Government as being likely to become endangered within the foreseeable future throughout all or a significant part of its range. (Consult the Federal Register listing in the Species Workbook Supplemental Manual.)
__ F-P	Federal Proposed	Species is officially identified by the Federal Government as being threatened and has been proposed for listing. (Consult the Federal Register listings in the Species Workbook Supplemental Manual.)
__ F-C	Federal Candidate	Species is officially identified by the Federal Government as under review or consideration for listing as an endangered or threatened species. (Consult the Federal Register listings in the Species Workbook Supplemental Manual.)
__ S-E	State Endangered	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as endangered.
__ S-T	State Threatened	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as threatened.

Code	Status	Definition
__ S-SC	State Special Concern Species	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as a species of special concern.
__ S-SU	State Status Undetermined	Species is officially recognized by the responsible State Government agency (Game Commission or Fish Commission) as status undetermined or status indeterminate.
__ S-X	State Extirpated	Species is officially classified by the responsible State Government agency (Game Commission or Fish Commission) as extirpated. These generally include species that have disappeared from Pennsylvania, but still exist elsewhere. For birds, includes species that do not presently nest in Pennsylvania, but did at one time.
__ MIGRATORY	Federal Migratory	Species is officially recognized by the Federal Government as a migratory bird in 50 CFR. (Consult the Species Workbook Supplemental Manual for a complete listing.)
__ COMMERCIAL	Commercial	Species is commercially harvested for fur or flesh value.
__ CONSUMP-REC	Consumptive Recreational	Species is harvested recreationally for fur, flesh, or trophy value and its defined as such by State or Federal Law; may be officially classified as "protected", "nongame", or "wild" animal.
__ NON-CONSUMP-REC	Non-consumptive Recreational	Species is not defined by State or Federal law as a species to be harvested recreationally; may be officially classified as "protected", "nongame", or "wild" animal.
__ INDICATOR	Biological Indicator	Species whose occurrence indicates environmental quality (e.g., presence indicates low levels of dissolved oxygen).
__ SENSITIVE	Sensitive	Species especially susceptible to environmental perturbation (e.g., raptor breeding success has been closely tied to pesticide application and exposure).
__ UNCLASSIFIED	Unclassified	Species has no recognized status in the Commonwealth of Pennsylvania or its status does not correspond to any of the above categories.

SPECIES DISTRIBUTION

The following sections have been designed to record the species distribution in the Commonwealth of Pennsylvania. First, the species distribution should be described in "narrative" form. Each item of information presented in this narrative should be referenced in the Narrative Reference section. After the narrative is completed, this information can then be used to fill out the remaining distribution sections [County distribution, distribution by watershed (OWDC Hydrologic Units), 1:24,000 scale USGS maps, latitude/longitude point locations, etc.].

Consider and use the following DEFINITIONS in completing the distribution section of this workbook:

Occurrence - a species occurs in an area if it breeds, winters, or significantly uses habitat in that area. A species would occur in an area if the animal occurs there sometime during the year and the presence of that area served some vital or essential role in the animal's life cycle (even though habitat utilization may not be considered great). When defining the species occurrence, remember that you are specifying those areas in which the species will be considered in environmental studies, research project planning, management planning, etc.

The following values will be used in recording species occurrence geographically in the Commonwealth: known to occur, known not to occur, occurrence is unknown. Use the following guideline and definitions to interpret reports and other data sources for recording species distribution and occurrence:

Known to occur: a species has "known" occurrence in an area if there exists recorded sightings, specimen data, and documentation/evidence that suggest occurrence (e.g., sightings in an area of previously documented ocurrence), or documentation/evidence judged by professional, expert opinion to be valid. Range maps might, but do not necessarily, qualify or meet these criteria. Occurrence must qualify as defined above.

Known not to occur: a species is "known not to occur" in an area, i.e., area is outside the range of the species distribution. This value only applies for County Distribution.

Unknown: a species occurrence in the area is unknown, i.e., unable to determine from the available information base or from expert opinion whether species occurrence is "known" in an area or whether the species is "known not to occur" in an area.

A. Distribution Narrative

The Distribution Narrative section is provided for compiling a complete profile of the species distribution within Pennyslvania. The schematic below is provided for mapping the species distribution.

This narrative will provide the core or base for data recorded in subsequent distribution sections and the database. Individuals accessing the database should find in this narrative a complete and concise description of known locations of the species and/or populations of the species, and be able to discern breeding locations, wintering locations, and areas of migratory occurrences.

In the first paragraph, provide a brief description of the species current and historic distribution in the Commonwealth. (This paragraph should be brief and concise, not exceeding 3-4 sentences or 10 lines of text.) In the next paragraphs, highlight areas of year-round occurrence, seasonal occurrence, and migratory occurrence. If the species is migratory only in Pennsylvania, indicate the general migratory movement pattern (e.g. by major water drainage or mountain chain) and general dates of movement.

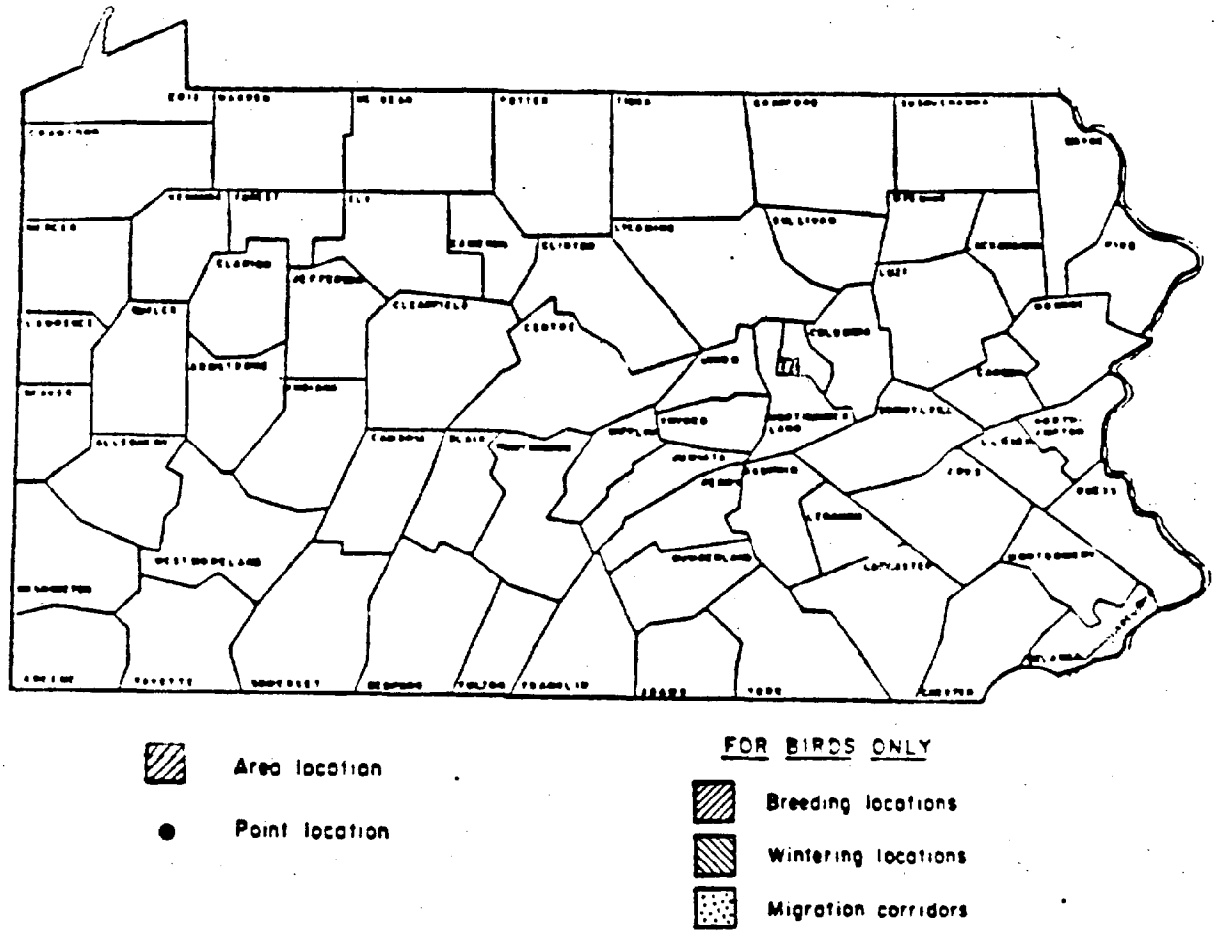
When describing the species distribution in these paragraphs, first indicate the general area of occurrences (region, county, watershed, national forest, game lands, state park/forest, etc.), then record information (if feasible) on site locations using reference points such as cities, roads/mileposts, topographic features/elevations, rivers/streams/reservoirs, quads, latitude/longitude, UTM coordinates, etc.

Be sure that possible occurrence (speculation and professional opinion) is noted as such, and that the occurrence type or mode is indicated (i.e., breeds in the following locations: . . .; winters in the following locations: . . ., etc.). Information related to relative abundance might also be included when available.

If precise distribution is considered too sensitive or secure to present in this workbook and the database give the name, title, affiliation, address, and business telephone number of the person(s) maintaining this information. Make certain that the individual(s) is consulted prior to providing the information.

Be certain to follow each item of distribution information with the reference code indicating the source of information, e.g., "known to occur in southeastern Pennsylvania in the counties of Chester, Delaware, and Berks (03:21, 05:14-16, 11:140)." Note that persons providing expert opinion/interpretation are considered a reference and should be assigned a reference code and cited in the REFERENCE section at the back of this workbook.

Map the species distribution below and narratively describe the distribution as instructed above in the space provided below and on the following pages.



In North America, the Brant ranges mainly along the Atlantic Coast (Ø3:74). Distribution maps may be found in Robbins (Ø1:4Ø) and Peterson (Ø8:map 22).

According to the A.O.U., the Brant: breeds in North America from Prince Patrick, Melville and Ellesmere islands south to Northern Keewatin (Adelaide Peninsula), Prince of Wales Island (probably), and Southampton, Coats and western Baffin islands, and in the Paleartic in northern Greenland, Spitsbergen and Franz Josef Land; and in North America from western (Kuskokwim Bay) and northern Alaska east to northern Mackenzie and Banks, Melville and Prince Patrick islands (probably also Victoria Island), and in the Paleartic along the coast of Siberia east to the Chukotski Peninsula and Anadyrland (Ø9:68-69).

B. References for Distribution (enter the reference codes for all references used in compiling the entries in this section, separate each reference code with a comma):

C. Statewide Resident Status

Check the one category that best describes the species' resident status in the Commonwealth.

	Code	Status	Definition
__	RES-B	Breeding Resident Only	Species primarily present during the breeding season only.
__	RES-W	Winter Resident Only	Species only present during most or all of the winter months.
__	RES-YR	Year-round Resident	Species breeds in Pennsylvania and is present year-round.
__	MIGRANT	Migratory Species	Species does not occur in Pennsylvania year-round or for an extended time period as described above, (i.e. is not a breeding or winter resident). Pensylvania is used only as a migration corridor.
__	UNKNOWN	Unknown	Species for which so few records exist in Pennsylvania that it cannot be classified into a different resident status cateogory.

D. Distribution by County

Complete the table that follows indicating species occurrence at the county level, seasonal occurrence within the counties in which the species "occurs", and species relative abundance within counties in which the species "occurs". Your entries in this table must correspond with information presented in the Distribution Narrative (Section A). Use the following codes and definitions in completing the table.

1. Occurrence codes and definitions are those defined earlier in the definitions.

Occurrence Codes

O - Known to occur
N - Known not to occur
X - Occurrence is unknown

2. Seasonal occurrence codes should be entered for counties in which the species is "known to occur". If the species does not occur in a county, or its occurence in a county is unknown, do not make an entry in that county blank for seasonal occurrence.

Seasonal Occurrence Codes

S... - Spring Migration only
SB.. - Spring Migration/Breeding Season
S.F. - Spring Migration/Fall Migration
S..W - Spring Migration/Winter Season
SBF. - Spring Migration/Breeding Season/Fall Migration
SB.W - Spring Migration/Breeding Season/Winter Season
S.FW - Spring Migration/Fall Migration/Winter Season
.B.. - Breeding Season only
.BF. - Breeding Season/Fall Migration
.B.W - Breeding Season/Winter Season
.BFW - Breeding Season/Fall Migration/Winter Season
..F. - Fall Migration only
..FW - Fall Migration/Winter Season
...W - Winter Season only

SBFW - Year-round Resident

XXXX - Occurrence in the county by season is unknown

3. Abundance codes should be entered for counties in which the species is "known to occur". If the species does not occur in a county, or its occurrence in a county is unknown, do not make an entry in that county blank for relative species abundance.

Abundance Codes

A - abundant (occurs regularly or in large numbers in appropriate habitat or season or is frequently observed)
C - medium abundance (i.e., common - occurs in small numbers in appropriate habitat or season; observed occasionally in prime habitat)
U - low abundance (i.e., uncommon - occupies a small percentage of suitable habitat; occupies a very specific limited habitat; very few individuals observed in prime habitat)
X - abundance in county is unknown

County Name	Occurrence Code	Seasonal Occurrence Code	Abundance Code
ALL COUNTIES			
Adams			
Allegheny			
Armstrong			
Beaver			
Bedford			
Berks			
Blair			
Bradford			
Bucks			
Butler			
Cambria			
Cameron			
Carbon			
Centre			
Chester			
Clarion			
Clearfield			
Clinton			
Columbia			
Crawford			
Cumberland			
Dauphin			
Delaware			
Elk			
Erie			
Fayette			
Forest			
Franklin			
Fulton			
Greene			
Huntingdon			
Indiana			
Jefferson			
Juniata			

Occurrence Codes

O - Known to occur
N - Known not to occur
X - Occurrence is unknown

Seasonal Occurrence Codes

S... - Spring Migration only
SB.. - Spring Migration/Breeding Season
S.F. - Spring Migration/Fall Migration
S..W - Spring Migration/Winter Season
SBF. - Spring Migration/Breeding Season/Fall Migration
SB.W - Spring Migration/Breeding Season/Winter Season
S.FW - Spring Migration/Fall Migration/Winter Season
.B.. - Breeding Season only
.BF. - Breeding Season/Fall Migration
.B.W - Breeding Season/Winter Season
.BFW - Breeding Season/Fall Migration/Winter Season
..F. - Fall Migration only
..FW - Fall Migration/Winter Season
...W - Winter Season only

SBFW - Year-round resident

Abundance Codes

A - Abundant
C - Medium abundance
U - Low abundance
X - Abundance is unknown

County Name	Occurrence Code	Seasonal Occurrence Code	Abundance Code
Lackawanna			
Lancaster			
Lawrence			
Lebanon			
Lehigh			
Luzerne			
Lycoming			
McKean			
Mercer			
Mifflin			
Monroe			
Montgomery			
Montour			
Northampton			
Northumberland			
Perry			
Philadelphia			
Pike			
Potter			
Schuylkill			
Snyder			
Somerset			
Sullivan			
Susquehanna			
Tioga			
Union			
Venango			
Warren			
Washington			
Wayne			
Westmoreland			
Wyoming			
York			

Occurrence Codes

O - Known to occur
N - Known not to occur
X - Occurrence is unknown

Seasonal Occurrence Codes

S... - Spring Migration only
SB.. - Spring Migration/Breeding Season
S.F. - Spring Migration/Fall Migration
S..W - Spring Migration/Winter Season
SBF. - Spring Migration/Breeding Season/Fall Migration
SB.W - Spring Migration/Breeding Season/Winter Season
S.FW - Spring Migration/Fall Migration/Winter Season
.B.. - Breeding Season only
.BF. - Breeding Season/Fall Migration
.B.W - Breeding Season/Winter Season
.BFW - Breeding Season/Fall Migration/Winter Season
..F. - Fall Migration only
..FW - Fall Migration/Winter Season
...W - Winter Season only

SBFW - Year-round resident

XXXX - Occurrence in the county by season is unknown

Abundance Codes

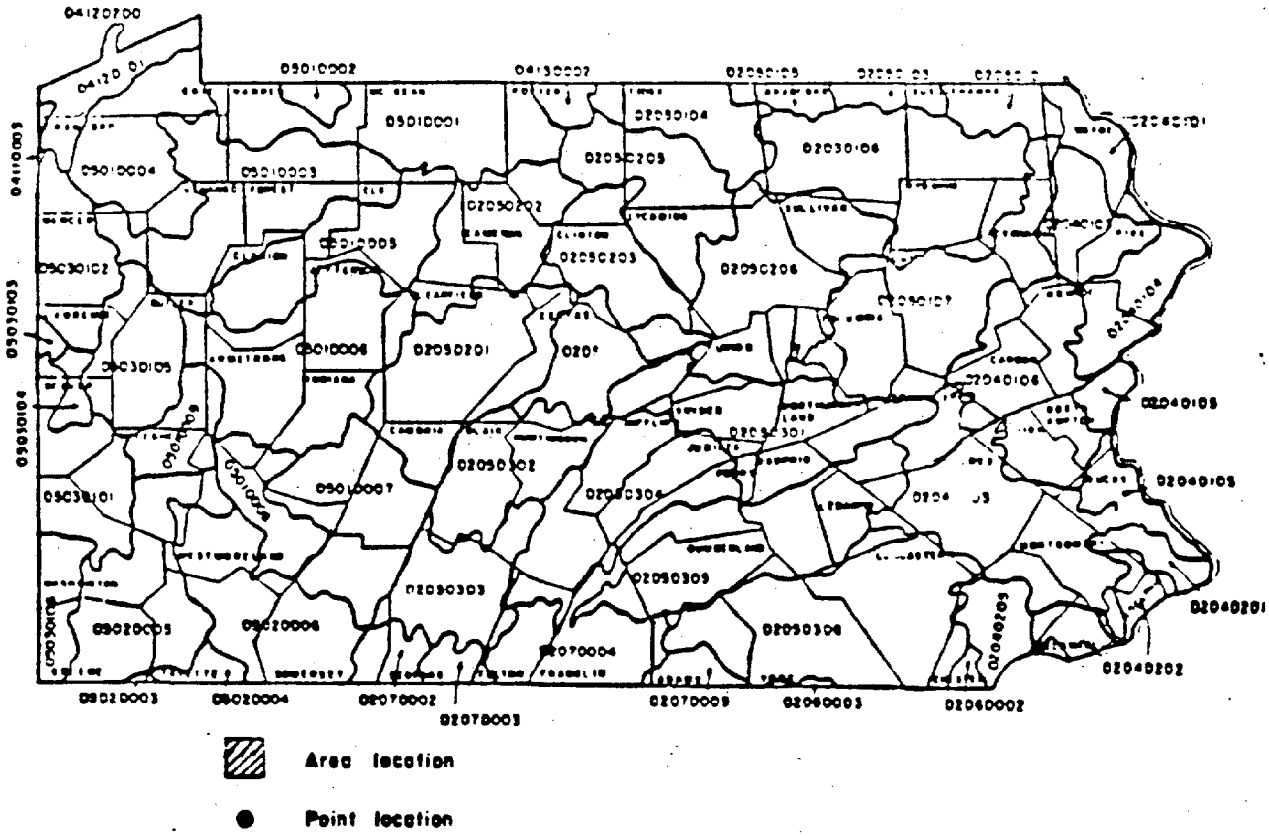
A - Abundant
C - Medium abundance
U - Low abundance
X - Abundance is unknown

General Distribution

E. Distribution by Office of Water Data Coordination (OWDC) Hydrologic Units in Pennsylvania

NOTE: OWDC hydrologic units refer to watersheds in the state, not aquatic habitats only; therefore, complete this section for all species. For bird species, entries should correspond with "resident" occurrence (breeding, wintering, year-round occurrences).

Using the map provided below (or the large scale - 1:500,000 USGS Hydrologic Unit Map of Pennsylvania) and the checklist on the next two pages, check all the OWDC hydrologic units (watersheds) in which the species "occurs". If the species is found statewide and in all watersheds, check "all" at the top of the list. Your entries should correspond with county level occurrence information (Section D) and the Distribution Narrative (Section A).



E. Distribution by OWDC Hydrologic Units (continued)

___ Species occurs in all OWDC hydrologic units to cataloging unit level as displayed on the USGS Hydrologic Unit Map.

Species does not occur statewide (i.e., in all OWDC hydrologic units), but occurs in the following units:

	Code	Definition
___	02040101	Upper Delaware:Upper Delaware
___	02040103	Upper Delaware:Lackawaxen
___	02040104	Upper Delaware:Middle Delaware-Mongaup-Brodhead
___	02040105	Upper Delaware:Middle Delaware-Musconetcong
___	02040106	Upper Delaware:Lehigh
___	02040201	Lower Delaware:Crosswicks-Neshaminy
___	02040202	Lower Delaware:Lower Delaware
___	02040203	Lower Delaware:Schuylkill
___	02040205	Lower Delaware:Brandywine-Christina
___	02050101	Upper Susquehanna:Upper Susquehanna
___	02050103	Upper Susquehanna:Owego-Wappasening
___	02050104	Upper Susquehanna:Tioga
___	02050105	Upper Susquehanna:Chemung
___	02050106	Upper Susquehanna:Upper Susquehanna-Tunkhannock
___	02050107	Upper Susquehanna:Upper Susquehanna-Lackawanna
___	02050201	West Branch Susquehanna:Upper West Branch Susquehanna
___	02050202	West Branch Susquehanna:Sinnemahoning
___	02050203	West Branch Susquehanna:Middle West Branch Susquehanna
___	02050204	West Branch Susquehanna:Bald Eagle
___	02050205	West Branch Susquehanna:Pine
___	02050206	West Branch Susquehanna:Lower West Branch Susquehanna
___	02050301	Lower Susquehanna:Lower Susquehanna-Penns
___	02050302	Lower Susquehanna:Upper Juniata
___	02050303	Lower Susquehanna:Raystown
___	02050304	Lower Susquehanna:Lower Juniata
___	02050305	Lower Susquehanna:Lower Susquehanna-Swatara
___	02050306	Lower Susquehanna:Lower Susquehanna
___	02060002	Upper Chesapeake:Chester-Sassafras
___	02060003	Upper Chesapeake:Gunpowder-Patapsco
___	02070002	Potomac:North Branch Potomac
___	02070003	Potomac:Cacapon-Town
___	02070004	Potomac:Conococheague-Opequon
___	02070009	Potomac:Monocacy
___	04110003	Southern Lake Erie:Ashtabula
___	04120101	Eastern Lake Erie:Chautauqua-Conneaut
___	04120200	Lake Erie:Lake Erie

E. Distribution by OWDC Hydrologic Units (continued)

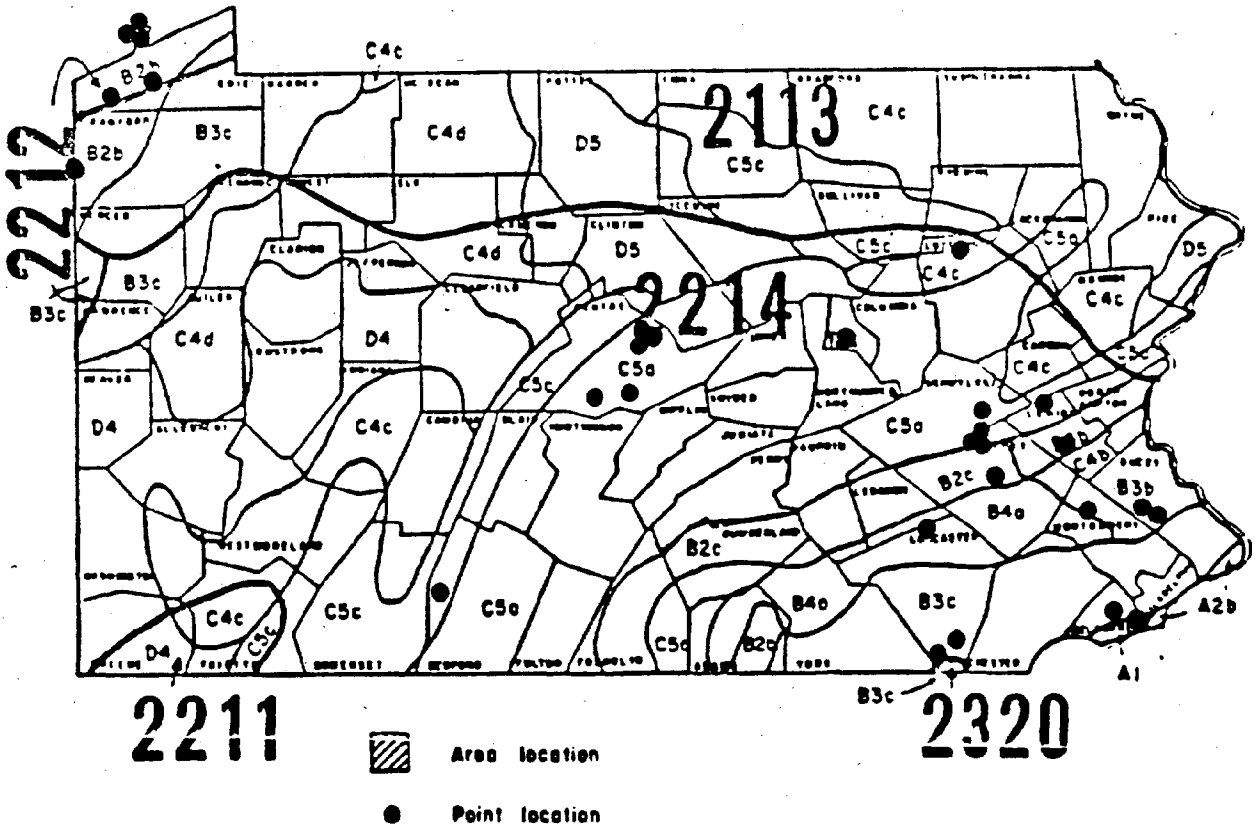
	Code	Definition
__	04130002	Southwestern Lake Ontario:Upper Genesee
__	05010001	Allegheny:Upper Allegheny
__	05010002	Allegheny:Conewango
__	05010003	Allegheny:Middle Allegheny
__	05010004	Allegheny:French
__	05010005	Allegheny:Clarion
__	05010006	Allegheny:Middle Allegheny-Redbank
__	05010007	Allegheny:Conemaugh
__	05010008	Allegheny:Kiskiminetas
__	05010009	Allegheny:Lower Allegheny
__	05020003	Monongahela:Upper Monongahela
__	05020004	Monongahela:Cheat
__	05020005	Monongahela:Lower Monongahela
__	05020006	Monongahela:Youghiogheny
__	05030101	Upper Ohio:Upper Ohio
__	05030102	Upper Ohio:Shenango
__	05030103	Upper Ohio:Mahoning
__	05030104	Upper Ohio:Beaver
__	05030105	Upper Ohio:Connoquenessing
__	05030106	Upper Ohio:Upper Ohio-Wheeling

F. Distribution by Ecoregions and Land Surface Forms in Pennsylvania

NOTE: Complete this section for all species.

Ecoregions are designed to stratify ecologically similar areas based on vegetation, soils, climate, and other factors. They are named after a vegetation type characteristic of the area and secondarily by landform. Although an animal species may not specifically associate with the particular vegetation type and/or landform used to name a region (e.g. Appalachian Oak Forest, High Hills), if it "occurs" in that map unit, it should be marked as occurring in that ecoregion.

Using the ecoregion map provided below and the checklist on the next page, check all ecoregions in which the species "occurs". For descriptions and definitions consult the explanatory notes in the Species Workbook Supplemental Manual. Bird species entries should correspond with "resident" occurrence (i.e., breeding, wintering, year-round occurrences). All entries should correspond with county level occurrence information (Section D), and the Distribution Narrative (Section A).



F. Distribution by Ecoregions and Land Surface Forms in Pennsylvania (cont.)

__ Species occurs in all Ecoregions and Land Surface Forms in Pennsylvania as displayed on the preceding map.

Species does not occur statewide (i.e., in all Ecoregions and Land Surface Forms in Pennsylvania), but occurs in the following units:

	Code	Definition
__	2113B2b	Northern Hardwoods Forest, 50-80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is in lowland
__	2113B3c	Northern Hardwoods Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland
__	2113C4c	Northern Hardwoods Forest, 20-50% gently sloping, 500-1000 ft. elevation, 50-75% of gentle slope is on upland
__	2113C4d	Northern Hardwoods Forest, 20-50% gently sloping, 500-1000 ft. elevation, more than 75% of gentle slope is on upland
__	2113C5a	Northern Hardwoods Forest, 20-50% gently sloping, 1000-3000 ft. elevation, more than 75% of gentle slope is in lowland
__	2113C5c	Northern Hardwoods Forest, 20-50% gently sloping, 1000-3000 ft. elevation, 50-75% of gentle slope is on upland
__	2113D50	Northern Hardwoods Forest, less than 20% gently sloping, 1000-3000 ft. elevation
__	2211C4c	Mixed Mesophytic Forest, 20-50% gently sloping, 500-1000 ft. elevation, 50-75% of gentle slope is on upland
__	2211C5c	Mixed Mesophytic Forest, 20-50% gently sloping, 1000-3000 ft. elevation, 50-75% of gentle slope is on upland
__	2211D40	Mixed Mesophytic Forest, less than 20% gently sloping, 500-1000 ft. elevation
__	2212B2b	Beech-Maple Forest, 50-80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is in lowland
__	2212B3c	Beech-Maple Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland
__	2214A10	Appalachian Oak Forest, more than 80% gently sloping, 0-100 ft. elevation
__	2214A2b	Appalachian Oak Forest, more than 80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is in lowland
__	2214B2c	Appalachian Oak Forest, 50-80% gently sloping, 100-300 ft. elevation, 50-75% of gentle slope is on upland
__	2214B3b	Appalachian Oak Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on lowland
__	2214B3c	Appalachian Oak Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland
__	2214B4a	Appalachian Oak Forest, 50-80% gently sloping, 500-1000 ft. elevation, less than 75% of gentle slope is in lowland
__	2214C4c	Appalachian Oak Forest, 20-50% gently sloping, 500-1000 ft. elevation, 50-75% of gentle slope is on upland

F. Distribution by Ecoregions and Land Surface Forms in Pennsylvania (cont.)

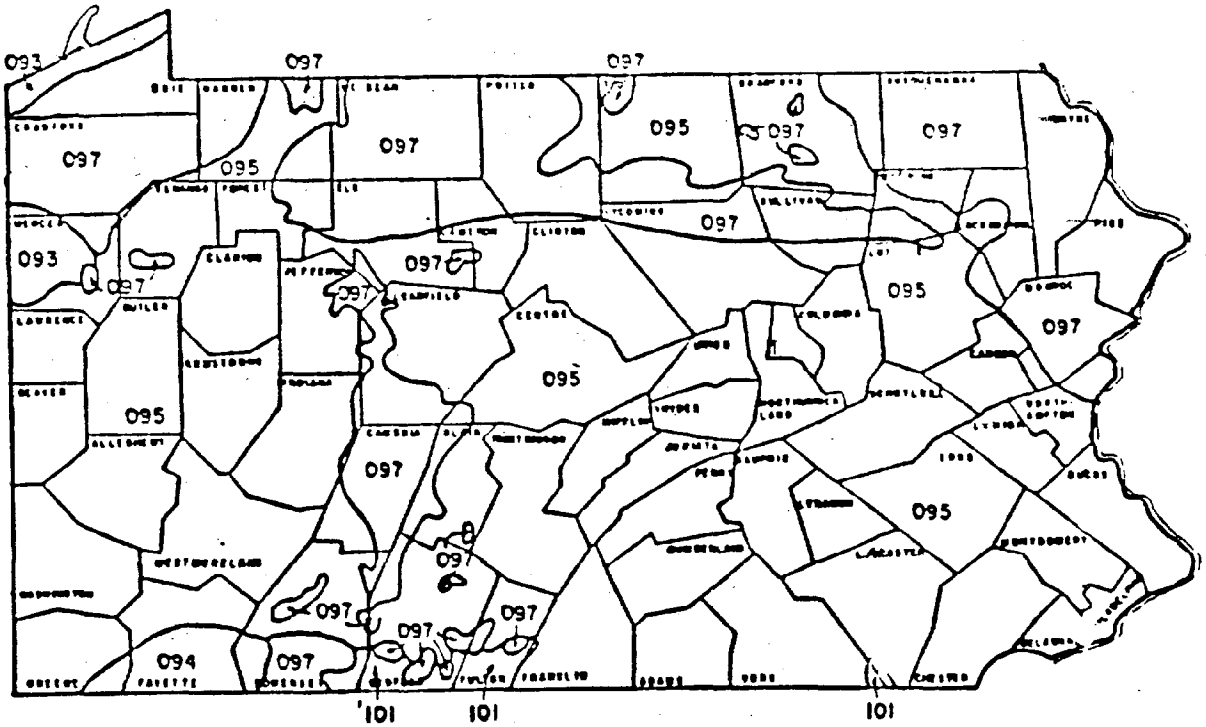
	Code	Definition
__	2214C4d	Appalachian Oak Forest, 20-50% gently sloping, 500-1000 ft. elevation, more than 75% of gentle slope is on upland
__	2214C5a	Appalachian Oak Forest, 20-50% gently sloping, 1000-3000 ft. elevation, less than 75% of gentle slope is in lowland
__	2214C5c	Appalachian Oak Forest, 20-50% gently sloping, 1000-3000 ft. elevation, 50-75% of gentle slope is on upland
__	2214D4Ø	Appalachian Oak Forest, less than 20% gently sloping, 500-1000 ft. elevation
__	2214D5Ø	Appalachian Oak Forest, less than 20% gently sloping, 1000-3000 ft. elevation
__	2320B3c	Southern Mixed Forest, 50-80% gently sloping, 300-500 ft. elevation, 50-75% of gentle slope is on upland

G. Distribution by Potential Natural Vegetation Types in Pennsylvania

NOTE: Complete this section for all species.

Potential natural vegetation types are vegetation types that would exist today if man were removed and plant succession after his removal were telescoped into a single moment; however, the effects of man's earlier activities are permitted to stand. As such the potential natural vegetation type portrays the biological potential of a site.

Using the map provided below and the checklist on the next page (or a large scale USGS map of potential natural vegetation types), identify all the potential natural vegetation types in which the species "occurs". Bird species entries should correspond with resident occurrence (i.e., breeding, wintering, year-round occurrences). Keep in mind that if the species "occurs" in the map unit, it should be marked as occurring in the potential natural vegetation type. All entries should correspond with county level occurrence information (Section D) and the Distribution Narrative (Section A).



G. Distribution by Potential Natural Vegetation Types in Pennsylvania (cont.)

___ Species occurs in all Potential Natural Vegetation types in Pennsylvania as displayed on the preceding page.

Species does not occur statewide (i.e., in all Potential Natural Vegetation types in Pennsylvania), but occurs in the following types:

Definition

___ Beech-Maple Forest
___ Mixed Mesophytic Forest
___ Appalachian Oak Forest
___ Northern Hardwoods
___ Oak-Hickory-Pine Forest

Site-Specific Distribution

H. Distribution by 7 1/2' Quadrangles

NOTE: Complete this section for all species.

Using the U.S. Geological Survey Index to Topographic Map Coverage in Pennsylvania provided in the Species Workbook Supplemental Manual, identify the seven (7) digit USGS 7 1/2' quadrangle code(s) and names that define the species occurrence within the Commonwealth of Pennsylvania. The format for quadrangle codes is as follows:

```
_ _/_ _ _/_/_
LAT  LONG UP OVER
          (N) (W)
```

The first two digits indicate the reference point latitude in degrees; the third, fourth, and fifth digits indicate the reference point longitude (values are right-justified - all longitudes in PA. would begin with 0, e.g., 80 would be 080); the sixth digit is the vertical one-degree row number counting up from the reference point; and the seventh digit is the horizontal one-degree cell counting over from the vertical row number. This is diagrammatically described in the appendix to the USGS 7 1/2' (1:24,000) series Quadrangle Map in the Species Workbook Supplemental Manual.

All entries should correspond with occurrence information provided in the Distribution Narrative (Section A).

****

__ Species occurs in all 7 1/2' quadrangles in Pennsylvania.

Species does not occur statewide, but occurs in the following quadrangle:

	Quad No.	Quad Name		Quad No.	Quad Name
__	3907567	Newark West	__	3907661	Rising Sun
__	3907568	Bay View	__	3907662	Conowingo Dam
__	3907572	Woodbury	__	3907663	Delta
__	3907573	Bridgeport	__	3907664	Fawn Grove
__	3907574	Marcus Hook	__	3907665	Norrisville
__	3907575	Wilmington North	__	3907666	New Freedom
__	3907576	Kennett Square	__	3907667	Lineboro
__	3907577	West Grove	__	3907668	Manchester
__	3907578	Oxford	__	3907671	Kirkwood
__	3907581	Camden	__	3907672	Wakefield
__	3907582	Philadelphia	__	3907673	Holtwood
__	3907583	Lansdowne	__	3907674	Airville
__	3907584	Media	__	3907675	Stewartstown
__	3907585	West Chester	__	3907676	Glen Rock
__	3907586	Unionville	__	3907677	Seven Valleys
__	3907587	Coatesville	__	3907678	Hanover
__	3907588	Parkesburg	__	3907681	Gap
			__	3907682	Quarryville
			__	3907683	Conestoga

	Quad No.	Quad Name
___	3907684	Safe Harbor
___	3907685	Red Lion
___	3907686	York
___	3907687	West York
___	3907688	Abbottstown
___	3907761	Littlestown
___	3907762	Taneytown
___	3907763	Emmitsburg
___	3907764	Blue Ridge Summit
___	3907765	Smithsburg
___	3907766	Hagerstown
___	3907767	Mason Dixon
___	3907768	Clear Spring
___	3907771	Mc Sherrystown
___	3907772	Gettysburg
___	3907773	Fairfield
___	3907774	Iron Springs
___	3907775	Waynesboro
___	3907776	Greencastle
___	3907777	Williamson
___	3907778	Mercersburg
___	3907781	Hampton
___	3907782	Biglerville
___	3907783	Arendtsville
___	3907784	Caledonia Park
___	3907785	Scotland
___	3907786	Chambersburg
___	3907787	St Thomas
___	3907788	Mc Connellsburg
___	3907861	Cherry Run
___	3907862	Hancock (WV)
___	3907863	Bellegrove
___	3907864	Artemas
___	3907865	Flintstone
___	3907866	Evitts Creek
___	3907867	Cumberland
___	3907868	Frostburg
___	3907871	Big Cove Tannery
___	3907872	Needmore
___	3907873	Amaranth
___	3907874	Chaneysville
___	3907875	Beans Cove
___	3907876	Hyndman
___	3907877	Fairhope
___	3907878	Wittenberg
___	3907881	Meadow Grounds
___	3907882	Breezewood
___	3907883	Mench
___	3907884	Clearville
___	3907885	Rainsburg
___	3907886	Buffalo Mills
___	3907887	New Baltimore
___	3907888	Berlin

	Quad No.	Quad Name
___	3907961	Avilton
___	3907962	Grantsville
___	3907963	Accident
___	3907964	Friendsville (MD)
___	3907965	Brandonville
___	3907966	Bruceton Mills
___	3907967	Lake Lynn
___	3907968	Morgantown North
___	3907971	Meyersdale
___	3907972	Markleton
___	3907973	Confluence
___	3907974	Ohiopyle
___	3907975	Ft Necessity
___	3907976	Brownfield
___	3907977	Smithfield
___	3907978	Masontown
___	3907981	Murdock
___	3907982	Rockwood
___	3907983	Kingwood
___	3907984	Mill Run
___	3907985	South Connellsville
___	3907986	Uniontown
___	3907987	New Salem
___	3907988	Carmichaels
___	3908061	Osage
___	3908062	Blacksville
___	3908063	Wadestown
___	3908064	Hundred
___	3908065	Littleton
___	3908071	Garards Fort
___	3908072	Oak Forest
___	3908073	Holbrook
___	3908074	New Freeport
___	3908075	Cameron (WV)
___	3908081	Mather
___	3908082	Waynesburg
___	3908083	Rogersville
___	3908084	Wind Ridge
___	3908085	Majorsville
___	4007417	Bristol
___	4007418	Beverly
___	4007426	Trenton East
___	4007427	Trenton West
___	4007428	Langhorne
___	4007437	Pennington
___	4007438	Lambertville
___	4007448	Stockton
___	4007511	Frankford
___	4007512	Germantown
___	4007513	Norristown
___	4007514	Valley Forge

Quad No.	Quad Name
4007515	Malvern
4007516	Downingtown
4007517	Wagontown
4007518	Honey Brook
4007521	Hatboro
4007522	Ambler
4007523	Lansdale
4007524	Collegeville
4007525	Phoenixville
4007526	Pottstown
4007527	Elverson
4007528	Morgantown
4007531	Buckingham
4007532	Doylestown
4007533	Telford
4007534	Perkiomenville
4007535	Sassamansville
4007536	Boyertown
4007537	Birdsboro
4007538	Reading
4007541	Lumberville
4007542	Bedminster
4007543	Quakertown
4007544	Milford Square
4007545	East Greenville
4007546	Manatawny
4007547	Fleetwood
4007548	Temple
4007551	Frenchtown
4007552	Riegelsville
4007553	Hellertown
4007554	Allentown East
4007555	Allentown West
4007556	Topton
4007557	Kutztown
4007558	Hamburg
4007562	Easton
4007563	Nazareth
4007564	Catasauqua
4007565	Cementon
4007566	Slatedale
4007567	New Tripoli
4007568	New Ringgold
4007571	Belvidere
4007572	Bangor
4007573	Wind Gap
4007574	Kunkletown
4007575	Palmerton
4007576	Lehighton
4007577	Nesquehoning
4007578	Tamaqua
4007581	Portland
4007582	Stroudsburg
4007583	Saylorsburg
4007584	Brodheadsville

Quad No.	Quad Name
4007585	Pohopoco Mtn
4007586	Christmans
4007587	Weatherly
4007588	Hazleton
4007611	New Holland
4007612	Leola
4007613	Lancaster
4007614	Columbia East
4007615	Columbia West
4007616	York Haven
4007617	Dover
4007618	Wellsville
4007621	Terre Hill
4007622	Ephrata
4007623	Lititz
4007624	Manheim
4007625	Elizabethtown
4007626	Middletown
4007627	Steelton
4007628	Lemoyne
4007631	Sinking Spring
4007632	Womelsdorf
4007633	Richland
4007634	Lebanon
4007635	Palmyra
4007636	Hershey
4007637	Harrisburg East
4007638	Harrisburg West
4007641	Bernville
4007642	Strausstown
4007643	Bethel
4007644	Fredericksburg
4007645	Indiantown Gap
4007646	Grantville
4007647	Enders
4007648	Halifax
4007651	Auburn
4007652	Friedensburg
4007653	Swatara Hill
4007654	Pine Grove
4007655	Tower City
4007656	Lykens
4007657	Elizabethville
4007658	Millersburg
4007661	Orwigsburg
4007662	Pottsville
4007663	Minersville
4007664	Tremont
4007665	Valley View
4007666	Klingerstown
4007667	Pillow
4007668	Dalmatia
4007671	Delano
4007672	Shenandoah

Quad No.	Quad Name
4007673	Ashland
4007674	Mt Carmel
4007675	Shamokin
4007676	Trevorton
4007677	Sunbury
4007678	Freeburg
4007681	Conyngham
4007682	Nuremberg
4007683	Shumans
4007684	Catawissa
4007685	Danville
4007686	Riverside
4007687	Northumberland
4007688	Lewisburg
4007711	Dillsburg
4007712	Mount Holly Springs
4007713	Dickinson
4007714	Walnut Bottom
4007715	Shippensburg
4007716	Roxbury
4007717	Fannettsburg
4007718	Burnt Cabins
4007721	Mechanicsburg
4007722	Carlisle
4007723	Plainfield
4007724	Newville
4007725	Newburg
4007726	Doylesburg
4007727	Shade Gap
4007728	Orbisonia
4007731	Wertzville
4007732	Shermansdale
4007733	Landisburg
4007734	Andersonburg
4007735	Blain
4007736	Blairs Mills
4007737	Aughwick
4007738	Butler Knob
4007741	Duncannon
4007742	Newport
4007743	Ickesburg
4007744	Spruce Hill
4007745	Mc Coysville
4007746	Mc Veytown
4007747	Newton Hamilton
4007748	Mount Union
4007751	Reward
4007752	Millerstown
4007753	Mexico
4007754	Mifflintown
4007755	Lewistown
4007756	Belleville
4007757	Allensville

Quad No.	Quad Name
4007758	Donation
4007761	Richfield
4007762	Beaver Springs
4007763	Mc Clure
4007764	Alfarata
4007765	Burnham
4007766	Barrville
4007767	Mc Alevys Fort
4007768	Pine Grove Mills
4007771	Middleburg
4007772	Beavertown
4007773	Weikert
4007774	Coburn
4007775	Spring Mills
4007776	Centre Hall
4007777	State College
4007778	Julian
4007781	Mifflinburg
4007782	Hartleton
4007783	Woodward
4007784	Millheim
4007785	Madisonburg
4007786	Mingoville
4007787	Bellefonte
4007788	Bear Knob
4007811	Hustontown
4007812	Wells Tannery
4007813	Everett East
4007814	Everett West
4007815	Bedford
4007816	Schellsburg
4007817	Central City
4007818	Stoystown
4007821	Saltillo
4007822	Saxton
4007823	Hopewell
4007824	New Enterprise
4007825	Alum Bank
4007826	Ogletown
4007827	Windbur
4007828	Hooversville
4007831	Cassville
4007832	Entriken
4007833	Martinsburg
4007834	Roaring Spring
4007835	Blue Knob
4007836	Beaverdale
4007837	Geistown
4007838	Johnstown
4007841	Huntingdon
4007842	Williamsburg
4007843	Frankstown
4007844	Hollidaysburg

	Quad No.	Quad Name
___	4007845	Cresson
___	4007846	Ebensburg
___	4007847	Nanty Glo
___	4007848	Vintondale
___	4007851	Alexandria
___	4007852	Spruce Creek
___	4007853	Bellwood
___	4007854	Altoona
___	4007855	Ashville
___	4007856	Carrolltown
___	4007857	Colver
___	4007858	Strongstown
___	4007861	Franklinville
___	4007862	Tyrone
___	4007863	Tipton
___	4007864	Blandburg
___	4007865	Coalport
___	4007866	Hastings
___	4007867	Barnesboro
___	4007868	Commodore
___	4007871	Port Matilda
___	4007872	Sandy Ridge
___	4007873	Houtzdale
___	4007874	Ramey
___	4007875	Irvona
___	4007876	Westover
___	4007877	Burnside
___	4007878	Rochester Mills
___	4007881	Black Moshannon
___	4007882	Philipsburg
___	4007883	Wallaceton
___	4007884	Glen Richey
___	4007885	Curwensville
___	4007886	Mahaffey
___	4007887	McGees Mills
___	4007888	Punxsutawney
___	4007911	Somerset
___	4007912	Bakersville
___	4007913	Seven Springs
___	4007914	Donegal
___	4007915	Connellsville
___	4007916	Dawson
___	4007917	Fayette City
___	4007918	California
___	4007921	Boswell
___	4007922	Ligonier
___	4007923	Stahlstown
___	4007924	Mammoth
___	4007925	Mt Pleasant
___	4007926	Smithton
___	4007927	Donora
___	4007928	Monongahela
___	4007931	Rachelwood

	Quad No.	Quad Name
___	4007932	Wilpen
___	4007933	Derry
___	4007934	Latrobe
___	4007935	Greensburg
___	4007936	Irwin
___	4007937	Mc Keesport
___	4007938	Glassport
___	4007941	New Florence
___	4007942	Bolivar
___	4007943	Blairsville
___	4007944	Saltsburg
___	4007945	Slickville
___	4007946	Murrysville
___	4007947	Braddock
___	4007948	Pittsburgh East
___	4007951	Brush Valley
___	4007952	Indiana
___	4007953	Mc Intyre
___	4007954	Avonmore
___	4007955	Vandergrift
___	4007956	New Kensington East
___	4007957	New Kensington West
___	4007958	Glenshaw
___	4007961	Clymer
___	4007962	Ernest
___	4007963	Elderton
___	4007964	Whitesburg
___	4007965	Leechburg
___	4007966	Freeport
___	4007967	Curtisville
___	4007968	Valencia
___	4007971	Marion Center
___	4007972	Plumville
___	4007973	Rural Valley
___	4007974	Mosgrove
___	4007975	Kittanning
___	4007976	Worthington
___	4007977	Saxonburg
___	4007978	Butler
___	4007981	Valier
___	4007982	Dayton
___	4007983	Distant
___	4007984	Templeton
___	4007985	East Brady
___	4007986	Chicora
___	4007987	East Butler
___	4007988	Mt Chestnut

	Quad No.	Quad Name
___	4008011	Ellsworth
___	4008012	Amity
___	4008013	Prosperity
___	4008014	Claysville
___	4008015	Valley Grove
___	4008021	Hackett
___	4008022	Washington East
___	4008023	Washington West
___	4008024	West Middletown
___	4008025	Bethany
___	4008031	Bridgeville
___	4008032	Cannonsburg
___	4008033	Midway
___	4008034	Avella
___	4008035	Steubenville East
___	4008041	Pittsburgh West
___	4008042	Oakdale
___	4008043	Clinton
___	4008044	Burgettstown
___	4008045	Weirton
___	4008051	Emsworth
___	4008052	Ambridge
___	4008053	Aliquippa
___	4008054	Hookstown
___	4008055	East Liverpool South
___	4008061	Mars
___	4008062	Baden
___	4008063	Beaver
___	4008064	Midland
___	4008065	East Liverpool North
___	4008071	Evans City
___	4008072	Zelienople
___	4008073	Beaver Falls
___	4008074	New Galilee
___	4008075	East Palestine
___	4008081	Prospect
___	4008082	Portersville
___	4008083	New Castle South
___	4008084	Bessemer
___	4008085	New Middletown
___	4107418	Flatbrookville
___	4107427	Culvers Gap
___	4107428	Lake Maskenozha
___	4107436	Port Jervis South
___	4107437	Milford
___	4107438	Edgemere
___	4107446	Port Jervis North
___	4107447	Pond Eddy
___	4107448	Shohola
___	4107458	Eldred (NY)
___	4107511	Bushkill
___	4107512	East Stroudsburg
___	4107513	Mount Pocono

	Quad No.	Quad Name
___	4107514	Pocono Pines
___	4107515	Blakeslee
___	4107516	Hickory Run
___	4107517	White Haven
___	4107518	Freeland
___	4107521	Twelve Mile Pond
___	4107522	Skytop
___	4107523	Buck Hill Falls
___	4107524	Tobyhanna
___	4107525	Thornhurst
___	4107526	Pleasant View Summit
___	4107527	Wilkes-Barre East
___	4107528	Wilkes-Barre West
___	4107531	Pecks Pond
___	4107532	Promised Land
___	4107533	Newfoundland
___	4107534	Sterling
___	4107535	Moscow
___	4107536	Avoca
___	4107537	Pittston
___	4107538	Kingston
___	4107541	Rowland
___	4107542	Hawley
___	4107543	Lakeville
___	4107544	Lake Ariel
___	4107545	Olyphant
___	4107546	Scranton
___	4107547	Ransom
___	4107548	Center Moreland
___	4107551	Narrowsburg
___	4107552	White Mills
___	4107553	Honesdale
___	4107554	Waymart
___	4107555	Carbondale
___	4107556	Dalton
___	4107557	Factoryville
___	4107558	Tunkhannock
___	4107561	Damascus
___	4107562	Galilee
___	4107563	Aldenville
___	4107564	Forest City
___	4107565	Clifford
___	4107566	Lenoxville
___	4107567	Hop Bottom
___	4107568	Springville
___	4107571	Callicoon
___	4107572	Long Eddy
___	4107573	Lake Como
___	4107574	Orson
___	4107575	Thompson
___	4107576	Harford
___	4107577	Montrose East
___	4107578	Montrose West
___	4107583	Hancock
___	4107584	Starrucca

	Quad No.	Quad Name
___	4107585	Susquehanna
___	4107586	Great Bend
___	4107587	Franklin Forks
___	4107588	Laurel Lake
___	4107611	Sybertsville
___	4107612	Berwick
___	4107613	Mifflinville
___	4107614	Bloomsburg
___	4107615	Millville
___	4107616	Washingtonville
___	4107617	Milton
___	4107618	Allenwood
___	4107621	Nanticoke
___	4107622	Shickshinny
___	4107623	Stillwater
___	4107624	Benton
___	4107625	Lairdsville
___	4107626	Hughesville
___	4107627	Muncy
___	4107628	Montoursville South
___	4107631	Harveys Lake
___	4107632	Sweet Valley
___	4107633	Red Rock
___	4107634	Elk Grove
___	4107635	Sonestown
___	4107636	Picture Rocks
___	4107637	Huntersville
___	4107638	Montoursville North
___	4107641	Noxen
___	4107642	Dutch Mtn
___	4107643	Lopez
___	4107644	Laporte
___	4107645	Eagles Mere
___	4107646	Hillsgrove
___	4107647	Barbours
___	4107648	Bodines
___	4107651	Meshoppen
___	4107652	Jenningsville
___	4107653	Colley
___	4107654	Dushore
___	4107655	Overton
___	4107656	Shunk
___	4107657	Grover
___	4107658	Ralston
___	4107661	Auburn Center
___	4107662	Laceyville
___	4107663	Wyalusing
___	4107664	Monroeton
___	4107665	Powell
___	4107666	Leroy
___	4107667	Canton
___	4107668	Gleason
___	4107671	Lawton

	Quad No.	Quad Name
___	4107672	Le Raysville
___	4107673	Rome
___	4107674	Towanda
___	4107675	Ulster
___	4107676	East Troy
___	4107677	Troy
___	4107678	Roseville
___	4107681	Friendsville
___	4107682	Little Meadows
___	4107683	Windham
___	4107684	Litchfield
___	4107685	Sayre
___	4107686	Bentley Creek
___	4107687	Gillett
___	4107688	Millerton
___	4107711	Williamsport SE
___	4107712	Carroll
___	4107713	Loganton
___	4107714	Mill Hall
___	4107715	Beech Creek
___	4107716	Howard
___	4107717	Snow Shoe SE
___	4107718	Snow Shoe
___	4107721	Williamsport
___	4107722	Linden
___	4107723	Jersey Shore
___	4107724	Lock Haven
___	4107725	Farrandsville
___	4107726	Howard NW
___	4107727	Snow Shoe NE
___	4107728	Snow Shoe NW
___	4107731	Cogan Station
___	4107732	Salladasburg
___	4107733	Waterville
___	4107734	Jersey Mills
___	4107735	Glen Union
___	4107736	Renovo East
___	4107737	Renovo West
___	4107738	Keating
___	4107741	Trout Run
___	4107742	White Pine
___	4107743	English Center
___	4107744	Cammal
___	4107745	Slate Run
___	4107746	Young Womans Creek
___	4107747	Tamarack
___	4107748	Hammersley Fork
___	4107751	Liberty
___	4107752	Nauvoo
___	4107753	Morris
___	4107754	Cedar Run
___	4107755	Lee Fire Tower
___	4107756	Oleona

	Quad No.	Quad Name
___	4107757	Short Run
___	4107758	Conrad
___	4107761	Blossburg
___	4107762	Cherry Flats
___	4107763	Antrim
___	4107764	Tiadaghton
___	4107765	Marshlands
___	4107766	Galeton
___	4107767	Cherry Springs
___	4107768	Ayers Hill
___	4107771	Mansfield
___	4107772	Crooked Creek
___	4107773	Keeneyville
___	4107774	Asaph
___	4107775	Sabinsville
___	4107776	West Pike
___	4107777	Brookland
___	4107778	Sweden Valley
___	4107781	Jackson Summit
___	4107782	Tioga
___	4107783	Elkland
___	4107784	Knoxville
___	4107785	Potter Brook
___	4107786	Harrison Valley
___	4107787	Ulysses
___	4107788	Ellisburg
___	4107811	Karthaus
___	4107812	Frenchville
___	4107813	Lecontes Mills
___	4107814	Clearfield
___	4107815	Elliott Park
___	4107816	Luthersburg
___	4107817	Du Bois
___	4107818	Reynoldsville
___	4107821	Pottersdale
___	4107822	Devils Elbow
___	4107823	The Knobs
___	4107824	Huntley
___	4107825	Penfield
___	4107826	Sabula
___	4107827	Falls Creek
___	4107828	Hazen
___	4107831	Sinnemahoning
___	4107832	Driftwood
___	4107833	Dents Run
___	4107834	Weedville
___	4107835	Kersey
___	4107836	Brandy Camp
___	4107837	Carman
___	4107838	Munderf
___	4107841	First Fork
___	4107842	Cameron
___	4107843	West Creek

	Quad No.	Quad Name
___	4107844	Rathbun
___	4107845	St Marys
___	4107846	Ridgway
___	4107847	Portland Mills
___	4107848	Hallton
___	4107851	Wharton
___	4107852	Emporium
___	4107853	Rich Valley
___	4107854	Wildwood Fire Tower
___	4107855	Glen Hazel
___	4107856	Wilcox
___	4107857	James City
___	4107858	Russel City
___	4107861	Austin
___	4107862	Keating Summit
___	4107863	Norwich
___	4107864	Crosby
___	4107865	Hazel Hurst
___	4107866	Mt Jewett
___	4107867	Kane
___	4107868	Ludlow
___	4107871	Coudersport
___	4107872	Roulette
___	4107873	Port Allegany
___	4107874	Smethport
___	4107875	Cyclone
___	4107876	Lewis Run
___	4107877	Westline
___	4107878	Cornplanter Bridge
___	4107881	Oswayo
___	4107882	Shinglehouse
___	4107883	Bullis Mills
___	4107884	Eldred
___	4107885	Derrick City
___	4107886	Bradford
___	4107887	Stickney
___	4107888	Cornplanter Run
___	4107911	Coolspring
___	4107912	Summerville
___	4107913	New Bethlehem
___	4107914	Sligo
___	4107915	Rimersburg
___	4107916	Parker
___	4107917	Hilliards
___	4107918	West Sunbury
___	4107921	Brookville
___	4107922	Corsica
___	4107923	Strattanville
___	4107924	Clarion
___	4107925	Knox
___	4107926	Emlenton
___	4107927	Eau Claire
___	4107928	Barkeyville

Quad No.	Quad Name
4107931	Sigel
4107932	Cooksburg
4107933	Lucinda
4107934	Fryburg
4107935	Kossuth
4107936	Cranberry
4107937	Kennerdell
4107938	Polk
4107941	Marienville East
4107942	Marienville West
4107943	Tylersburg
4107944	Tionesta
4107945	President
4107946	Oil City
4107947	Franklin
4107948	Utica
4107951	Lynch
4107952	Mayburg
4107953	Kellettville
4107954	West Hickory
4107955	Pleasantville
4107956	Titusville South
4107957	Dempseytown
4107958	Sugar Lake
4107961	Sheffield
4107962	Cherry Grove
4107963	Cobham
4107964	Tidioute
4107965	Grand Valley
4107966	Titusville North
4107967	Centerville
4107968	Townville
4107971	Clarendon
4107972	Warren
4107973	Youngsville
4107974	Pittsfield
4107975	Spring Creek
4107976	Spartansburg
4107977	Lake Canadohta
4107978	Millers Station
4107981	Scandia
4107982	Russell
4107983	Sugar Grove
4107984	Lottsville
4107985	Columbus
4107986	Corry
4107987	Union City
4107988	Waterford
4108011	Slippery Rock
4108012	Harlansburg
4108013	New Castle North
4108014	Edinburg
4108015	Campbell

Quad No.	Quad Name
4108021	Grove City
4108022	Mercer
4108023	Greenfield
4108024	Sharon East
4108025	Sharon West
4108031	Sandy Lake
4108032	Jackson Center
4108033	Fredonia
4108034	Sharpsville
4108035	Orangeville
4108041	New Lebanon
4108042	Hadley
4108043	Greenville East
4108044	Greenville West
4108045	Kinsman
4108051	Cochranton
4108052	Geneva
4108053	Conneaut Lake
4108054	Hartstown
4108055	Andover
4108061	Blooming Valley
4108062	Meadville
4108063	Harmonsburg
4108064	Linesville
4108065	Leon
4108071	Cambridge Springs
4108072	Edinboro South
4108073	Conneautville
4108074	Beaver Center
4108075	Pierpoint
4108081	Cambridge Springs NE
4108082	Edinboro North
4108083	Albion
4108084	East Springfield
4108085	Conneaut
4207615	Waverly
4207616	Wellsburg
4207617	Elmira
4207618	Seeley Creek
4207711	Caton
4207811	Allentown
4207812	Bolivar
4207917	Wattsburg
4207918	Hammett
4207927	North East
4207928	Harborcreek
4208011	Erie South
4208012	Swanville
4208013	Fairview
4208014	Fairview SW
4208021	Erie North

I. Distribution by Latitude and Longitude

NOTE: Complete this section for 1) special status species, including federal and/or state designations of endangered, threatened, species of special concern, status undetermined, and status indeterminate, and 2) species with a limited resident distribution in Pennsylvania (i.e., species occurring in less than 5% of Pennsylvania counties).

This section is divided into two data entry parts - in part one point locations should be entered and/or the second part enter a series of latitude/longitude points that enclose an area or polygon in which the species occurs.

Latitude and longitude are to be expressed in degrees, minutes, and seconds. Examples are: latitude 03°20'10", longitude 096°36'15". Latitude and longitude should be entered in the following parts as a string separated by commas (e.g., 0320100963615,0320100953620, etc.).

All entries in this section should correspond with occurrence information provided in the Distribution Narrative (Section A).

1. Point Locations - this should be used for species of very limited distribution to designate occurrence (e.g. bald eagle nests, Indiana bat caves, etc.). Separate each latitude/longitude string (13 characters) with a comma.

LATITUDE	LONGITUDE		LATITUDE	LONGITUDE		LATITUDE	LONGITUDE	
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,

2. Polygon or Areal Locations - use this part to describe a more widespread species, or a species of more general occurrence (but still falling into one of the above special status designations). Most appropriately describe the boundary using a series of latitudes and longitudes that encompass a number of point locations that are clustered should fully define the species areas of occurrence in regions of the State.

POLYGON #1:

_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	

POLYGON #2:

_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	,
_____	_____	,	_____	_____	,	_____	_____	

POLYGON #3:

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

POLYGON #4:

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

POLYGON #5:

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

POLYGON #6:

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

POLYGON #7:

_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

POPULATION CHARACTERISTICS (STATEWIDE)

Complete the following checklists. These checklists are used to summarize information in a consistent format with standard definitions facilitating automated data element search and retrieval.

Checklist entries should be consistent with the information presented in the distribution narrative. Check all categories and values in a category that apply.

A. Population Trend (Statewide)

__ Increasing
__ Stable
__ Decreasing
__ No trend

B. Reasons for Population Trend

__ Low Reproductive Potential
__ Periphery of Range
__ Overharvesting
__ Disease
__ Predation
__ Environmental Contaminants
__ Herbicides
__ Pesticides/Insecticides
__ Habitat Loss
__ Habitat Improvement
__ Range Expansion (Habitat Addition)
__ Underharvesting
__ High Reproduction
__ Seasonal and Catastrophic Weather Conditions
__ Interspecific Competition
__ Intraspecific Competition

C. Population Potential Through Habitat Manipulation

__ Increase <10%
__ Increase 10-25%
__ Increase >25%
__ Decrease <10%
__ Decrease 10-25%
__ Decrease >25%

ORIGIN

In the following section, describe the species origin within Pennsylvania. (Use terms like native, introduced, reintroduced, exotic, etc.). If the species is not native to Pennsylvania, include descriptive information concerning the source of animals, etc. Be certain to follow each item of information with the reference code and page numbers that indicate the source of the information.

REFERENCES

Record the complete citations for the references you used to complete this booklet. If the information was from verbal communications with a recognized expert, record the individual expert's name, affiliation, and address, and date of communication. Assign each citation a two (2) digit code number for use in completing the various sections of this workbook. Enter the references used in completing this booklet in sequential order. The first reference number (00) is reserved for your name and address, telephone number, and affiliation - even if you are not referencing yourself in the remainder of the workbook.

Use the following convention when citing reference sources: Author name(s), date, title, source document, pages in source document. Specific questions should be referenced to the Data Base Manager or the CBE (Council of Biology Editors, 1978) Style Manual.

Code	Citation
00	

APPENDIX D.

SEDGE WREN SPECIES ACCOUNT PRIOR TO UPDATING.

```
 1:
 2:     RECORDS FROM DATASET: PA
 3:     DATE: 89/01/23   TIME: 14:18:42
 4:     SETNAME: A
 5:
 6: <SPECIES-CODE> 0400153   <GROUP> BIRDS   <COMMON-NAME> WREN, SEDGE
 7: <SCI-NAME> CISTOTHORUS PLATENSIS   <%COUNTIES> 100%
 8: <STATUS> NON-CONSUMP-REC,SEE COMMENTS,S-T   <HABITAT> RIPARIAN
 9: <TROPHIC-L>     <TROPHIC-J> CARNIVORE   <TROPHIC-A> CARNIVORE
10: <ORIGIN> NATIVE   <PAST> UNKNOWN   <FUTURE> UNKNOWN   <OWNERSHIP>
11: <TERRITORY> ENTIRE   <DISPERSION> UNKNOWN   <ACRES> UNKNOWN
12: <SQ.MILES> UNKNOWN   <PERIODICITY> DIURNAL,CREPUSCULAR,DAY ONLY
13: <PHYLUM> CHORDATA   <CLASS> AVES   <ORDER> PASSERIFORMES
14: <FAMILY> TROGLODYTIDAE   <GENUS> CISTOTHORUS   <SPECIES> PLATENSIS
15: <SUBPHYLUM>     <SUBCLASS>     <SUBORDER>     <SUBFAMILY>     <SUBGENUS>
16: <SUBSPECIES>     <AUTHORITY> LATHAM   <ENTERED> 81/07/23   <UPDATED>
17: <DUMMY1>     <DUMMY2>     <DUMMY3>     <DUMMY4>     <DUMMY5>
18: <DISTRIB-PRES>
19:    001,003,005,007,009,011,013,015,017,019,021,023,025,027,029,
20:    031,033,035,037,039,041,043,045,047,049,051,053,055,057,059,
21:    061,063,065,067,069,071,073,075,077,079,081,083,085,087,089,
22:    091,093,095,097,099,101,103,105,107,109,111,113,115,117,119,
23:    121,123,125,127,129,131,133
24: <D-PRES-T>
25:    ADAMS,ALLEGHENY,ARMSTRONG,BEAVER,BEDFORD,BERKS,BLAIR,BRADFORD,BUCKS,
26:    BUTLER,CAMBRIA,CAMERON,CARBON,CENTRE,CHESTER,CLARION,CLEARFIELD,
27:    CLINTON,COLUMBIA,CRAWFORD,CUMBERLAND,DAUPHIN,DELAWARE,ELK,ERIE,
28:    FAYETTE,FOREST,FRANKLIN,FULTON,GREENE,HUNTINGDON,INDIANA,JEFFERSON,
29:    JUNIATA,LACKAWANNA,LANCASTER,LAWRENCE,LEBANON,LEHIGH,LUZERNE,LYCOMING,
30:    MCKEAN,MERCER,MIFFLIN,MONROE,MONTGOMERY,MONTOUR,NORTHAMPTON,
31:    NORTHUMBERLAND,PERRY,PHILADELPHIA,PIKE,POTTER,SCHUYLKILL,SNYDER,
32:    SOMERSET,SULLIVAN,SUSQUEHANNA,TIOGA,UNION,VENANGO,WARREN,WASHINGTON,
33:    WAYNE,WESTMORELAND,WYOMING,YORK
34: <DISTRIB-ABS>
35: <D-ABS-T>
36: <DISTRIB-UNK>
37: <D-UNK-T>
38: <ABUNDANCE-HI>
39: <A-HI-T>
40: <ABUNDANCE-M>
41: <A-M-T>
42: <ABUNDANCE-LO>
43: <A-LO-T>
44: <LATLON>
45: <QUAD>
46: <QUAD-T>
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131:    ARTHROPODS-OTHER TERRESTRIAL
132: <NICHE-E>
133:    05030E,05390D,05390O,05390P,05450X,05990X,06530X
134: <NICHE-E-T>
135:    WATER LEVEL:SATURATED,INLAND WETLAND:BOGS,
136:    INLAND WETLAND:WEEDBEDS-STREAM,INLAND WETLAND:WEEDBEDS-LAKE,
137:    AQUATIC|TERRESTRIAL ECOTONE:UNKNOWN,NEST SITES:UNKNOWN,
138:    MEADOWS:UNKNOWN
139: <NICHE-LF>
140: <NICHE-LF-T>
141: <NICHE-LR>
142: <NICHE-LR-T>
143: <NICHE-P>
144: <NICHE-P-T>
145: <NICHE-JF>
146:    05060E,05420D,05420O,05420P,05480X,06020X,06560X
147: <NICHE-JF-T>
148:    WATER LEVEL:SATURATED,INLAND WETLAND:BOGS,
149:    INLAND WETLAND:WEEDBEDS-STREAM,INLAND WETLAND:WEEDBEDS-LAKE,
150:    AQUATIC|TERRESTRIAL ECOTONE:UNKNOWN,NEST SITES:UNKNOWN,
151:    MEADOWS:UNKNOWN
152: <NICHE-JR>
153:    05060E,05420D,05420O,05420P,05480X,06020X,06560X
154: <NICHE-JR-T>
155:    WATER LEVEL:SATURATED,INLAND WETLAND:BOGS,
156:    INLAND WETLAND:WEEDBEDS-STREAM,INLAND WETLAND:WEEDBEDS-LAKE,
157:    AQUATIC|TERRESTRIAL ECOTONE:UNKNOWN,NEST SITES:UNKNOWN,
158:    MEADOWS:UNKNOWN
159: <NICHE-AB>
160:    05080E,05440D,05440O,05440P,05500X,06040X,06580X
161: <NICHE-AB-T>
162:    WATER LEVEL:SATURATED,INLAND WETLAND:BOGS,
163:    INLAND WETLAND:WEEDBEDS-STREAM,INLAND WETLAND:WEEDBEDS-LAKE,
164:    AQUATIC|TERRESTRIAL ECOTONE:UNKNOWN,NEST SITES:UNKNOWN,
165:    MEADOWS:UNKNOWN
166: <NICHE-AF>
167:    05070E,05430D,05430O,05430P,05490X,06570X
168: <NICHE-AF-T>
169:    WATER LEVEL:SATURATED,INLAND WETLAND:BOGS,
170:    INLAND WETLAND:WEEDBEDS-STREAM,INLAND WETLAND:WEEDBEDS-LAKE,
171:    AQUATIC|TERRESTRIAL ECOTONE:UNKNOWN,MEADOWS:UNKNOWN
172: <NICHE-AR>
173:    05070E,05430D,05430O,05430P,05490X,06570X
174: <NICHE-AR-T>
175:    WATER LEVEL:SATURATED,INLAND WETLAND:BOGS,
176:    INLAND WETLAND:WEEDBEDS-STREAM,INLAND WETLAND:WEEDBEDS-LAKE,
177:    AQUATIC|TERRESTRIAL ECOTONE:UNKNOWN,MEADOWS:UNKNOWN
178: <MANAGEMENT-B>
```

01, THRASHERS AND THEIR ALLIES. U. S. NAT'L. MUS. BULL. 195. 475 PP.
02CHECKLIST COMMITTEE OF THE AMERICAN BIRDING ASSOCIATION. 1975. A. B.
02A. CHECKLIST: BIRDS OF CONTINENTAL UNITED STATES AND CANADA. 64 PP.
03IMHOF, T. A. 1976. ALABAMA BIRDS. 2ND ED. UNIV. OF ALABAMA PRESS.
03445 PP.
04PENNSYLVANIA GAME COMMISSION. 1977. THE COMMONWEALTH OF PENNSYLVANIA
04GAME LAWS. PA. GAME COMM., HARRISBURG. 137 PP.
05WOOD, M. 1979. BIRDS OF PENNSYLVANIA. PENN STATE UNIV. UNIVERSITY
05PARK, PA. 133 PP.

<REF-CODES>

C-OCCURRENCE	05
AUTHORITY	03
DISTRIBUTION/ABUNDANCE	051979
%COUNTIES	05
HYDROUNIT	05
ECOREGION	05
PNV	05
STATUS	04
ORIGIN	02
TERR/DISPERS/ACRES/SQML	01
PERIODICITY	01,03
HABITAT	01
NWI-SYSTEM	01,03
NWI-AHC/AQUATIC	01,03
FOOD-J	01,03
FOOD-A	01,03
NICHE-E	01,03
NICHE-JF	01,03
NICHE-JR	01,03
NICHE-AB	01,03
NICHE-AF	01,03
NICHE-AR	01,03
MANAGEMENT-B	01,03
MANAGEMENT-A	01,03
C-MANAGEMENT	01,03

<C-OCCURRENCE>
REGULAR MIGRANT. *05*
<C-TAXONOMY>
<C-STATUS>
PROTECTED- CANNOT BE LEGALLY HUNTED OR SOLD. *04*
<C-FOOD-L>
<C-FOOD-J>
YOUNG ARE FED VERY SMALL INSECTS BY PARENTS. *01*
<C-FOOD-A>
MAINLY EAT WEEVILS, ANTS, FLIES, MOSQUITOES, BUGS, GRASSHOPPERS, MOTHS
, SPIDERS, BEETLES, CATERPILLARS, LOCUSTS, AND CRICKETS. *01,03*
<C-FOOD-G>
<C-FOOD-S>

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65: <ECOREGION-T>
66:    NORTHERN HARDWOODS,MIXED MESOPHYTIC FOREST,BEECH-MAPLE FOREST,
67:    APPALACHIAN OAK FOREST,SOUTHEASTERN MIXED FOREST
68: <PNV>
69:    093,094,095,097,101
70: <PNV-T>
71:    BEECH-MAPLE,MIXED MESOPHYTIC,APPALACHIAN OAK,NORTHERN HARDWOODS,
72:    OAK-HICKORY-PINE
73: <FTYPE>
74:    UNKNOWN
75: <FTYPE-T>
76:    UNKNOWN
77: <FSIZE>
78:    UNKNOWN
79: <RANGELAND>
80:    UNKNOWN
81: <RANGELAND-T>
82:    UNKNOWN
83: <AGRICULTURE>
84:    UNKNOWN
85: <AGRI-T>
86:    UNKNOWN
87: <FOREST>
88:    UNKNOWN
89: <FOREST-T>
90:    UNKNOWN
91: <URBAN>
92:    UNKNOWN
93: <URBAN-T>
94:    UNKNOWN
95: <WATER>
96:    UNKNOWN
97: <WATER-T>
98:    UNKNOWN
99: <BARREN>
100:   UNKNOWN
101: <BARREN-T>
102:   UNKNOWN
103: <NWI-SYSTEM>
104:   RIVERINE,LACUSTRINE,PALUSTRINE
105: <NWI-AHC>
106:   POEMO   ,*PO,EMO,
107:   POSSO   ,*PO,SSO,
108:   R2EMO   ,*R2,EMO,
109:   L2EMO   ,*L2,EMO
110: <NWI-AHC-T>
111:   *PALUSTRINE,EMERGENT,*PALUSTRINE,SCRUB/SHRUB,
112:   *RIVERINE,LOWER PERENNIAL,EMERGENT,*LACUSTRINE,LITTORAL,EMERGENT
```

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263: <C-NICHE-AR>
264:    REST ON MARSH VEGETATION. *01*
265: <C-NICHE-G>
266: <C-NICHE-S>
267: <C-MANAGEMENT>
268:    MUST ACQUIRE AND MAINTAIN MARSHLANDS AND WET MEADOWS TO INCREASE THE
269:    AVAILABLE HABITAT FOR THIS AND MANY OTHER SPECIES. *01,03*
270: <C-OTHER>
271:    *****DISTRIBUTION BY COUNTY (DISTRIB-|ABUNDANCE-)*****
272:    REGULAR MIGRANT SPRING AND FALL. CASUAL BREEDER; REPORTED IN ERIE,
273:    LUZERNE, AND MONROE COUNTIES. *05*
274:    *****PERIODICITY DESCRIPTORS (PERIODICITY)*****
275:    VERY ACTIVE AT DAWN AND DUSK. *03*
276:    *****NATIONAL WETLAND INVENTORY SYSTEM (NWI-SYSTEM)*****
277:    OCCURS IN GRASSY EDGES OF MARSHES, IN WET MEADOWS, AND ALONG
278:    BOG MARGINS. *01,03*
279: <DUMMY6>
280: <DUMMY7>
281: <DUMMY8>
282: <DUMMY9>
283: <DUMMY10>
284:
285: NUMBER OF RECORDS REPORTED:      1
286:
287: COMPLETED.
288: COMMAND?
EOF:288
0:>
```

APPENDIX E

Updated species profile of the Sedge wren

040153

CAT = "04"
NAME = "WREN, SEDGE"
PHYLUM = "CHORDATA"
CLASS = "AVES"
ORDER = "PASSERIFORMES"
FAMILY = "TROGLODYTIDAE"
GENUS = "CISTOTHORUS"
SPECIES = "PLATENSIS"
AUTHORITY = "(LATHAM)"
R.TAXONOMY = "6049"
STATUS = "121,202"
".STATUS = "FEDERAL MIGRATORY,STATE THREATENED"
".STATUS = "THE SEDGE WREN IS LISTED AS THREATENED IN PENNSYLVANIA (13 PA BULLETIN 1026). IT IS ALSO PROTECTED BY THE MIGRATORY BIRD TREATY ACT (50 CFR 1.1 PART 10.13) AND THE PENNSYLVANIA GAME LAWS AND IS LISTED AS A SPECIES OF SPECIAL CONCERN BY THE AUDUBON SOCIETY'S BLUE LIST (01:233). THE U.S. FISH AND WILDLIFE SERVICE AND THE PENNSYLVANIA GAME COMMISSION ARE RESPONSIBLE FOR THE PROTECTION AND MANAGEMENT OF THIS SPECIES. IN PENNSYLVANIA THE SEDGE WREN IS A RARE TRANSIENT AND SUMMER RESIDENT OF VERY LOCAL DISTRIBUTION AND ERRATIC OCCURRENCE, BECOMING EVEN MORE RARE IN RECENT YEARS (02:50). BOTH WARREN AND SUTTON REMARK ABOUT THE SECRETIVE NATURE OF THIS BIRD. SUTTON SAYS, "UNLESS THEY ARE SINGING OR LITERALLY KICKED OUT OF THE GRASS, THEY WILL NOT BE SEEN" (03:152). WARREN WROTE THAT HE BELIEVED IT WAS ACTUALLY MORE PLENTIFUL AND GENERALLY DISTRIBUTED THAN IT WAS THOUGHT TO BE BY NATURALISTS AND COLLECTORS (04:312). GILL (05:35) REPORTS THAT AT ONE TIME (PRIOR TO 1950), THE SEDGE WREN COULD BE FOUND, ALTHOUGH NEVER ABUNDANTLY, IN MANY LOCATIONS ACROSS THE COMMONWEALTH. SINCE THAT TIME, HOWEVER, IT HAS DISAPPEARED FROM MOST FORMER LOCATIONS AND HAS DECLINED OR BECOME SPORADIC IN OTHERS. THE LACK OF UNDISTURBED HABITAT AND CHANGING AGRICULTURAL PRACTICES MAY BE ONE FACTOR CONTRIBUTING TO ITS DECLINE. OTHER REASONS ARE UNKNOWN (05:315)."
".OCCUR.COUNTY =
SEAS.OCCUR = "E,E,E,E,E,E,E,E,E,E,E,E,E,E,E,E,E,E,E,E"
".UNK.COUNTY =
".ABUND.CTY = "Low abundance,Low abundance"
".HYDRO.CODE = "UPPER DELAWARE: LACKAWAXEN,UPPER DELAWARE: MIDDLE DELAWARE-MONGAUP-BRODHEAD,UPPER DELAWARE: LEHIGH,LOWER DELAWARE: LOWER DELAWARE,LOWER DELAWARE: SCHUYLKILL,LOWER DELAWARE: BRANDYWINE-CHRISTINA,UPPER SUSQUEHANNA: UPPER SUSQUEHANNA-LACKAWANNA,WEST BRANCH SUSQUEHANNA: UPPER WEST BRANCH SUSQUEHANNA,LOWER SUSQUEHANNA: UPPER JUNIATA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA,UPPER CHESAPEAKE: CHESTER-SASSAFRAS,EASTERN LAKE ERIE: CHAUTAUQUA-CONNEAUT,LAKE ERIE: LAKE ERIE,ALLEGHENY: CONEWANGO,ALLEGHENY: FRENCH,ALLEGHENY: CLARION,ALLEGHENY: KISKIMINETAS,MONONGAHELA: LOWER MONONGAHELA,MONONGAHELA: YOUGHIGHENY,UPPER OHIO: SHENANGO,UPPER OHIO: CONNOQUENESSING,UPPER OHIO: UPPER OHIO-WHEELING"
".QUAD.CODE = "NEWARK WEST,BAY VIEW,BRIDGEPORT,MARCUS HOOK,WILMINGTON NORTH,KENNETT SQUARE,WEST GROVE,OXFORD,LANSDOWNE,MEDIA,WEST CHESTER,UNIONVILLE,COATESVILLE,PARKESBURG,RISING SUN,CONOWINGO DAM,KIRKWOOD,WAKEFIELD,HOLTWOOD,GAP,QUARRYVILLE,CONESTOGA,SAFE HARBOR,GRANTSVILLE,UNIONTOWN,NORRISTOWN,VALLEY FORGE,MALVERN,DOWNINGTOWN,WAGONTOWN,HONEY BROOK,PHOENIXVILLE,POTTSTOWN,ELVERSON,MORGANTOWN,BOYERTOWN,BIRDSBORO,READING,QUAKERTOWN,EAST GREENVILLE,MANATAWNY,FLEETWOOD,TEMPLE,TOPTON,KUTZTOWN,HAMBURG,NEW TRIPOLI,NEW RINGGOLD,WIND

GAP,KUNKLETOWN,STROUDSBURG,SAYLORSBURG,BRODHEADSVILLE,POHOPOCO MTN,NEW HOLLAND,LEOLA,LANCASTER,COLUMBIA EAST,COLUMBIA WEST,YORK HAVEN,TERRE HILL,EPHRATA,LITITZ,MANHEIM,ELIZABETHTOWN,MIDDLETOWN,SINKING
HABITAT = "TERRESTRIAL"
R.HABITAT = "5818"
SAF = "red maple-grass|forb-,--"
R.SAF.TYPE = "88"
LAND.USE = "62"
T.LAND.USE = "WETLAND: NONFORESTED"
R.LAND.USE = "507,4628,5818"
WETLANDS = "Palustrine-Emergent: persistent"
R.NWI = "437,507,4282"
TROPHIC = "CARNIVORE"
FOOD.HABITS =
R.FOOD.J = "437,4592,4630,5125,5962"
R.FOOD.A = "437,4592,4630,5125,5962"
ENVIRON.ASSOC = "Breeding Adult-Ecotones: Grassland|water,Feeding Adult-Ecotones: Grassland|water,Feeding Juvenile-Ecotones: Grassland|water,General-Terrestrial Features: Bare ground,Resting Adult-Ecotones: Grassland|water,Resting Juvenile-Ecotones: Grassland|water,-"
R.ENVIRON = "88"
C.ENVIRON = "IT FORAGES ON BARE SOIL. IT USES HERBACEOUS GROUND COVER AND SHRUBS FOR ALL ACTIVITIES. IT IS FOUND NEAR STANDING SALTWATER *88*."
R.ENVIRON.E = "437,507,4282"
C.ENVIRON.E = "IT PREFERS TO NEST IN SEDGE OR GRASS MEADOWS AND MARSHES THAT HAVE LITTLE OR NO WATER *437,507,4282*."
R.ENVIRON.FJ = "437,507,4282"
R.ENVIRON.RJ = "437,507,4282"
R.ENVIRON.FA = "437,507,4282"
R.ENVIRON.RA = "437,507,4282"
R.ENVIRON.BA = "437,507,4282"
C.ENVIRON.BA = "IT PREFERS TO NEST IN SEDGE OR GRASS MEADOWS AND MARSHES THAT HAVE LITTLE TO NO WATER *437,507,4282*."
LIFE.HIST = "|REPRODUCTION: THE BREEDING SEASON IN KANSAS, BASED ON EGG DATES LASTS FROM LATE JULY THROUGH AUGUST *4282*. THIS SPECIES IS BOTH MONOGAMOUS AND POLYGYNOUS. THE INCUBATION PERIOD IS 12-14 DAYS *437,507*. THE CLUTCH SIZE RANGES FROM 4-9 EGGS *507*. THIS SPECIES HAS TWO BROODS PER YEAR. |BEHAVIOR: IT IS FOUND IN MISSOURI IN ALL SEASONS. IT USES A PERCH AS A DISPLAY SITE. IT FORAGES BY GLEANING AND PROBING ON THE GROUND, IN THE WATER, AND IN THE AIR. THE NEST IS BUILT IN GRASS OR EMERGENT AQUATIC VEGETATION. THE NEST IS NO MORE THAN 2 FEET ABOVE WATER OR GROUND *437*. IT IS BUILT OF GRASSES, VEGETATIVE DOWN, LEAVES, AND HAIR OR FEATHERS. IT IS A GLOBULAR STRUCTURE, ABOUT 3.5 INCHES BY 3.5 INCHES *507*. THE ALTRICIAL YOUNG ARE CARED FOR BY THE FEMALE. HOWEVER, THE MALE MAY ASSIST OCCASIONALLY *437*. IT IS ACTIVE IN MORNING AND NIGHT *5125*. |ORIGIN: IT IS NATIVE TO NORTH AMERICA.|||"
R.LIFE.HIST = "437,507,4282,5125,5962"
C.LIFE.HIST = "THE SEDGE WREN BREEDS MAINLY IN THE NORTHEASTERN UNITED STATES, THE ADJACENT SOUTHERN EDGE OF CANADA, AND IN MIDDLE AMERICA. IT WINTERS IN THE SOUTHEASTERN UNITED STATES AND MIDDLE AMERICA (17:88). THE SEDGE WREN IS FOUND AS A NATIVE BREEDING RESIDENT AND MIGRANT IN PENNSYLVANIA."
MANAGEMENT = "ADVERSE-DEVELOPING|MAINTAINING MUDFLATS,ADVERSE-Draining wetlands, marshes, ponds, lakes,ADVERSE-CONSTRUCTION OF NAVIGATIONAL IMPROVEMENTS (DAMS, LOCKS, ETC.),ADVERSE-DREDGING,ADVERSE-PRESCRIBED|CONTROLLED BURNING OF HABITAT,ADVERSE-APPLYING PESTICIDES,ADVERSE-APPLYING INSECTICIDES,ADVERSE-CONTROLLING UNDESIRABLE PLANT SPECIES,BENEFICIAL-DEVELOPING|MAINTAINING FRESHWATER MARSH,BENEFICIAL-Developing|maintaining|protecting

wetlands,BENEFICIAL-Controlling sedimentation,BENEFICIAL-Controlling pollution [thermal, chemical, physical],BENEFICIAL-Controlling water levels,BENEFICIAL-EXCLUDING LIVESTOCK FROM BANKS AND WATER"
R.MGT.B = "4628,5818"
R.MGT.A = "4628,5818"

ALL.REFS =
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APPENDIX F.

UPDATED SPECIES PROFILE OF THE AMERICAN SHAD.

010128

CAT = "01"
NAME = "ALOSA SAPIDISSIMA"
PHYLUM = "CHORDATA"
GENUS = "ALOSA"
SPECIES = "SAPIDISSIMA"
STATUS = "401,221"
T.STATUS = "COMMERCIAL,GAME (CONSUMPTIVE RECREATIONAL)"
C.STATUS = "THE ANADROMOUS AMERICAN SHAD, ALOSA SAPIDISSIMA, IS A POPULAR SPORT FISH IN THE DELAWARE RIVER DURING ITS SPRING SPAWNING MIGRATION. ITS WORTH IS ESTIMATED AT SEVERAL MILLION DOLLARS, WITH THE RECREATIONAL DEMAND EXPECTED TO INCREASE IN THE FUTURE (01:10). IN 1896 THE DELAWARE RIVER BASIN CONTRIBUTED THE HIGHEST PERCENTAGE (OVER 30%) TO THE ENTIRE COASTAL COMMERCIAL CATCH (01:9). POPULATION DECLINES HAVE GREATLY REDUCED THE COMMERCIAL FISHERY (01:2). NEW JERSEY AND DELAWARE STILL MAINTAIN SMALL COMMERCIAL FISHERIES, HOWEVER, NO COMMERCIAL LANDINGS HAVE BEEN REPORTED FROM PENNSYLVANIA SINCE 1942 (01:9). THE ONLY NON-TIDAL COMMERCIAL FISHERY IS THE LEWIS FISHERY AT LAMBERTVILLE, NEW JERSEY (01:4). THE DELAWARE RIVER BASIN CATCHES GREATLY DECLINED IN THE EARLY 1900'S (01:2) DUE TO THE INTRODUCTION OF A GILL NET FISHERY, MORTALITY OF YOUNG-OF-YEAR IN ELL WEIRS, AND CONSTRUCTION OF A DAM AT LACKAWAXEN, PENNSYLVANIA IN 1823 (01:1). MORE RECENTLY, POLLUTION, CAUSING A LOW DISSOLVED OXYGEN BLOCK IN THE LOWER RIVER, IS CONSIDERED THE MOST CRITICAL LIMITING FACTOR TO AMERICAN SHAD PRODUCTION (01:4;02:II-15). IN THE LAST DECADE, SHAD POPULATIONS HAVE SIGNIFICANTLY INCREASED DUE TO A REDUCTION IN THE DURATION OF THE POLLUTION BLOCK (02:II-15). ATTEMPTS TO INCREASE THE SIZE OF THE SHAD POPULATION SHOULD FOCUS ON POINT AND NON-POINT POLLUTION CONTROL (01:8). THE SUSQUEHANNA RIVER SYSTEM ONCE SUPPORTED ONE OF THE MOST IMPORTANT SHAD FISHERIES ON THE ATLANTIC COAST (03:5), BUT THE SHAD IS NOW PROTECTED IN THIS SYSTEM (00). OVERFISHING, POLLUTION, AND DAM CONSTRUCTION RESULTED IN A POPULATION DECLINE SO THAT BY 1928 THE FISHERY WAS NONEXISTENT (03:5). RESTORATION EFFORTS HAVE BEEN UNDERWAY FOR OVER 100 YEARS (03:6) WITH LITTLE SUCCESS (00). CURRENTLY THE U.S. FISH AND WILDLIFE SERVICE, PENNSYLVANIA FISH COMMISSION, MARYLAND DEPARTMENT OF NATURAL RESOURCES, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, SUSQUEHANNA RIVER BASIN COMMISSION, PHILADELPHIA ELECTRIC COMPANY, PENNSYLVANIA POWER AND LIGHT COMPANY, SAFE HARBOR WATER POWER CORPORATION, AND YORK HAVEN POWER COMPANY, IN A JOINT EFFORT KNOWN AS THE SUSQUEHANNA RIVER ANADROMOUS FISH RESTORATION COMMITTEE, ARE ATTEMPTING TO REBUILD STOCKS IN THE SUSQUEHANNA RIVER BASIN THROUGH STOCKING OF FRY AND FINGERLINGS, TRAP AND TRANSPORT OF WITHIN BASIN PRE-SPAWNED ADULTS, AND TRANSFER OF OUT-OF BASIN PRE-SPAWNED ADULTS (04:II). THE DELAWARE RIVER BASIN FISH AND WILDLIFE MANAGEMENT COOPERATIVE CONSISTS OF MEMBERS FROM PENNSYLVANIA, NEW JERSEY, NEW YORK, DELAWARE, NATIONAL MARINE FISHERIES SERVICE, AND U.S. FISH AND WILDLIFE SERVICE. ITS GOAL IS TO MANAGE INTERSTATE FISHERIES RESOURCES IN THE DELAWARE BASIN. IMPLEMENTATION OF THE MANAGEMENT PLAN IS THE RESPONSIBILITY OF EACH STATE (05:II-13). THE PENNSYLVANIA FISH COMMISSION IS RESPONSIBLE FOR MANAGEMENT IN PENNSYLVANIA (00). THE SUSQUEHANNA RIVER ANADROMOUS FISH RESTORATION COMMITTEE, CONSISTING OF THE AGENCIES AND UTILITIES MENTIONED PREVIOUSLY, IS THE MAJOR DIRECTIVE BODY FOR RESTORATION EFFORTS IN THE SUSQUEHANNA RIVER (05:II-13). THE PENNSYLVANIA FISH COMMISSION, HOWEVER, IS RESPONSIBLE FOR IMPLEMENTATION OF MANAGEMENT RECOMMENDATIONS AND LEGAL ISSUES (00)."
T.OCCUR.COUNTY =
SEAS.OCCUR = "E,E,E,E,E,E,E,I,E,E,E,E,E,E,E,E,E,E,E"
T.ABS.COUNTY =
T.ABUND.CTY = "Low abundance,Abundant,Low abundance,Low abundance,Abundant,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Abundant,Abundant,Abundant,Low abundance"
T.HYDRO.CODE = "UPPER DELAWARE: UPPER DELAWARE,UPPER DELAWARE: MIDDLE DELAWARE-MONGAUP-BRODHEAD,UPPER DELAWARE: MIDDLE DELAWARE-MUSCONETCONG,UPPER DELAWARE: LEHIGH,LOWER DELAWARE: CROSSWICKS-NESHAMINY,LOWER DELAWARE: LOWER DELAWARE,LOWER

DELAWARE: SCHUYLKILL,UPPER SUSQUEHANNA: OWEGO-WAPPASENING,UPPER SUSQUEHANNA: UPPER SUSQUEHANNA-TUNKHANNOCK,UPPER SUSQUEHANNA: UPPER SUSQUEHANNA-LACKAWANNA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA-PENNS,LOWER SUSQUEHANNA: LOWER JUNIATA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA-SWATARA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA"
T.QUAD.CODE = "WOODBURY,BRIDGEPORT,CAMDEN,PHILADELPHIA,CONOWINGO DAM,DELTA,WAKEFIELD,HOLTWOOD,AIRVILLE,CONESTOGA,SAFE HARBOR,BRISTOL,BEVERLY,TRENTON EAST,TRENTON WEST,PENNINGTON,LAMBERTVILLE,STOCKTON,FRANKFORD,WILKES-BARRE WEST,LUMBERVILLE,FRENCHTOWN,RIEGELSVILLE,EASTON,NAZARETH,CATASAUQUA,BELVIDERE,BANGOR,PORTLAND,STROUDSBURG,COLUMBIA EAST,COLUMBIA WEST,YORK HAVEN,MIDDLETOWN,STEELTON,LEMOYNE,HARRISBURG EAST,HARRISBURG
LIFE.HIST = "THE ANADROMOUS AMERICAN SHAD, ALOSA SAPIDISSIMA, IS NATIVE TO THE DELAWARE AND SUSQUEHANNA RIVER BASINS (12:57;13:124). HOWEVER, THE CURRENT SUSQUEHANNA RIVER STOCK IS A HODGE-PODGE OF MANY STOCKS (EAST COAST AND WEST COAST) USED IN THE PRODUCTION OF FRY, AND FROM OUT-OF BASIN ADULT TRANSFERS (00)."
ALL.REFS =
** (ed.)..*

APPENDIX G.

Updated Species Profile of the King rail.

042080

CAT = "04"
NAME = "RAIL, KING"
PHYLUM = "CHORDATA"
CLASS = "AVES"
ORDER = "GRUIFORMES"
FAMILY = "RALLIDAE"
GENUS = "RALLUS"
SPECIES = "ELEGANS"
AUTHORITY = "AUDUBON"
R.TAXONOMY = "528,4923,6049,6052,10864,11153"
C.TAXONOMY = "SUBSPECES R.E. ELEGANS OCCURS IN ILLINOIS *11153*. CONFUSION OVER RELATION TO CLAPPER RAIL OCCURRED AT ONE TIME BUT AS OF NOW RECOGNIZED AS SEPARATE SPECIES *11152,6052*."
STATUS = "121,201,223"
F.STATUS = "FEDERAL MIGRATORY,STATE ENDANGERED,NONGAME-PROTECTED"
C.STATUS = "IN 1966 ROBBINS CLASSIFIED THE KING RAIL AS BEING COMMON WITHIN ITS RANGE (01:104). ON A NATIONWIDE BASIS, THE AUDUBON SOCIETY PLACED THE KING RAIL ON THEIR BLUE LIST BETWEEN 1976 AND 1982, AS A RESULT OF DECLINING POPULATIONS. HOWEVER, IN 1986 THE SPECIES WAS SWITCHED TO THE CATEGORY OF SPECIAL CONCERN WITH POPULATIONS NOTED AS STABLE OR UP WHERE REPORTED (02:230). NO SPECIFIC PENNSYLVANIA DATA WAS CITED. ALTHOUGH THE SPECIES IS LESS COMMON NOW THAN IN THE PAST (03:304), DATA IS LACKING TO DETERMINE ANY PRESENT TREND IN THE COMMONWEALTH. THE KING RAIL IS LISTED WITH THE PENNSYLVANIA GAME COMMISSION AS BEING ENDANGERED WITHIN THE STATE (13 PA BULLETIN 1026). IT IS ALSO PROTECTED BY THE MIGRATORY BIRD TREATY ACT (50 CFR 1.1 PART 10.13) AND PENNSYLVANIA GAME LAWS. THE U.S. FISH AND WILDLIFE SERVICE AND THE PENNSYLVANIA GAME COMMISSION ARE RESPONSIBLE FOR THE MANAGEMENT AND PROTECTION OF THE KING RAIL."
F.OCCUR.COUNTY =
"BERKS,BUTLER,CENTRE,CHESTER,CRAWFORD,DELAWARE,ERIE,LANCASTER,LAWRENCE,MERCER,MONROE,PHILADELPHIA,UNION,WESTMORELAND"
SEAS.OCCUR = "E,E,E,O,E,E,C,E,E,E,E,E,E,E"
F.UNK.COUNTY =
F.ABUND.CTY = "Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance,Low abundance"
F.HYDRO.CODE = "UPPER DELAWARE: LEHIGH,LOWER DELAWARE: LOWER DELAWARE,LOWER DELAWARE: SCHUYLKILL,LOWER DELAWARE: BRANDYWINE-CHRISTINA,WEST BRANCH SUSQUEHANNA: UPPER WEST BRANCH SUSQUEHANNA,WEST BRANCH SUSQUEHANNA: LOWER WEST BRANCH SUSQUEHANNA,LOWER SUSQUEHANNA: UPPER JUNIATA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA,SOUTHERN LAKE ERIE: ASHTABULA,EASTERN LAKE ERIE: CHAUTAUQUA-CONNEAUT,LAKE ERIE: LAKE ERIE,ALLEGHENY: KISKIMINETAS,MONONGAHELA: YOUGHIGHENY,UPPER OHIO: SHENANGO,UPPER OHIO: CONNOQUENESSING"
F.QUAD.CODE = "WOODBURY,BRIDGEPORT,CAMDEN,PHILADELPHIA,LANSDOWNE,WEST CHESTER,UNIONVILLE,CONESTOGA,SAFE HARBOR,BEVERLY,FRANKFORD,VALLEY FORGE,MALVERN,READING,FLEETWOOD,TEMPLE,KUTZTOWN,HAMBURG,LANCASTER,COLUMBIA EAST,LITITZ,STATE COLLEGE,JULIAN,LIGONIER,STAHLSTOWN,MT PLEASANT,POCONO PINES,BLAKESLEE,TOBYHANNA,THORNHURST,MILTON,ALLENWOOD,SLIPPERY ROCK,HARLANSBURG,GROVE CITY,MERCER,HARTSTOWN,ANDOVER,LINESVILLE,LEON,ERIE SOUTH,SWANVILLE,ERIE NORTH"
HABITAT = "TERRESTRIAL"
R.HABITAT = "431,475,528,772,1227,4876,7969,11149,11150,11153,430451"
RIPARIAN = "YES"
R.RIPARIAN = "430,431,451,475,528,772,1227,4876,5415,5803,5806,5921,7969,11149,11150,11153,48765416"
FSIZE = "1"

T.FSIZE = "Unstocked"
R.FSIZE = "88,4732"
SAF = "red maple-grass|forb-,--"
R.SAF.TYPE = "88"
LAND.USE = "21,51,52,53,54,62"
T.LAND.USE = "AGRICULTURE:CROPLAND|PASTURE,WATER: STREAMS-CANALS,WATER: LAKES,WATER: RESERVOIRS,WATER: BAYS-ESTUARIES,WETLAND: NONFORESTED"
R.LAND.USE = "430,431,475,528,772,1227,4732,4876,5416,5806,5921,7969,11149,11150,11153,5862507"
WETLANDS = "Lacustrine: littoral-Emergent: persistent,Lacustrine: littoral-Emergent: nonpersistent,Lacustrine: littoral-Emergent: narrow-leaved nonpersistent,Lacustrine: littoral-Emergent: narrow-leaved persistent,Palustrine-Emergent: persistent,Palustrine-Emergent: persistent,Palustrine-Emergent: persistent,Palustrine-Emergent: persistent,Palustrine-Emergent: nonpersistent,Palustrine-Emergent: narrow-leaved nonpersistent,Palustrine-Emergent: narrow-leaved persistent,Palustrine-Scrub|shrub: deciduous,Riverine: lower-Emergent: persistent,Riverine: lower-Emergent: persistent,Riverine: lower-Emergent: persistent,Riverine: lower-Emergent: persistent,Riverine: lower-Emergent: narrow-leaved persistent"
R.NWI = "431,1227,4469,4737,4876,5415,5806,5842,5843,5844,5862,5921,6175,6285,7969,11149,11150,11153,48765416"
C.HAB.ASSOC = "THIS SPECIES OCCURS IN FRESHWATER OR BRACKISH MARSHES, IN EMERGENT VEGETATION OF EXTENSIVE MARSHES ALONG STREAMS, PONDS, AND RIVERS *528,430*. MARSHES RANGE IN DEPTH FROM SEVERAL INCHES TO FOUR FEET DEEP AND IN AREA FROM 0.2 ACRES TO 18 ACRES. THE VEGETATION ALSO PREFERRED INCLUDE CALAMAGROSTIS CANADENSIS, SPARTINA PECTINATA, CAREX VULPINOIDEA, FLUMINEA FESTUCACEA, ACORUS CALAMUS, POLYGONUM COCCINEUM AND SCIRPUS ACUTUS *4957*, AND TYPHA MARSHES *4737*."
ANIMAL.PLANT = "ECTOPARASITES *1913*,PLANTS: SEDGE, CAREX LACUSTRIS,JUNCUS EFFUSUS, CAREX STIPATA, C. HYLANOPELIS,PHYNCHOSPORA SP. AND TYPHA LATIFOLIA FOR NESTING COVER *1217*"
R.ANIMAL.PLANT = "430,475,1217,1836,1896,1913,4737,4876"
C.ANIMAL.PLANT = "FOR A LIST OF DISEASES AND PARASITES SEE THE GENERAL REFERENCE *1896*."
TROPHIC = "OMNIVORE"
R.TROPHIC = "430,431,475,1227,1599,4876,11151,11153,5284876"
FOOD.HABITS =
R.FOOD.G = "430,431,475,528,1227,1599,4876,11153,7764876"
R.FOOD.I = "430,475,528,1227,1599,4876,11153"
C.FOOD = "IN ARIZONA, CRAYFISH ARE 61% OF THE DIET IN THE SPRING, 22% IN THE SUMMER, AND 3% IN THE FALL *5416*. IN ARIZONA, MORE THAN 90% OF THE SPRING AND SUMMER DIET IS ANIMAL, WITH 74% IN THE FALL *4876*. THIS SPECIES CONSUMES A WIDE VARIETY OF FOODS *430*. THE ANIMAL FOOD COMPONENT OF 114 STOMACHS WAS 90% (SPRING|SUMMER), 74% (FALL) AND 58% (WINTER) *475*. THE WINTER DIET IS SUBSIDIZED WITH MARSH PLANT SEEDS AND THEY MAY RAID AGRICULTURAL FIELDS *776*."
R.FOOD.J = "430,475,528,4876,5843,5844"
C.FOOD.J = "JUVENILES FEED WITH THE PARENT ON GRASS SEEDS, INSECTS, TADPOLES, LEECHES, AND SMALL CRAYFISH *430*."
R.FOOD.A = "430,431,475,528,1227,1599,4624,4683,4698,4876,4976,5414,5803,5841,5843,5844,11153,54164876"
C.FOOD.A = "THE ADULTS FEED ON THE SEEDS AND LEAVES OF MARSH GRASSES, CRAYFISH, MOLLUSCS, SMALL FISH, INSECTS, SLUGS, LEECHES, AND TADPOLES *430*. THE MAJOR FOOD IS CRUSTACEANS *5414,4624,4876*. IN ARIZONA, 79% OF THE ANNUAL DIET WAS ANIMAL MATTER *4876*. IN ARIZONA, CRAYFISH MAKE UP 23% OF THE ANNUAL DIET (BY VOLUME) *5416*. IN ARIZONA, CULTIVATED RICE MAKES UP 16% OF THE ANNUAL DIET *5416*."
ENVIRON.ASSOC = "Breeding Adult-Aquatic Vegetation Density: High,Breeding Adult-Aquatic Habitat Zonation: Littoral zone inhabitant,Breeding Adult-Water Level: Permanently flooded,Breeding Adult-Water Depth: < 1 ft.,Breeding Adult-Coastal Zone: Mudflats,Breeding Adult-Inland Wetlands: Seasonally flooded with emergent vegetation,Breeding Adult-Inland Wetlands: Inland fresh meadows [fen],Breeding Adult-Inland Wetlands: Inland shallow fresh marshes,Breeding Adult-Inland Wetlands: Inland deep fresh marshes,Breeding Adult-Inland Wetlands: Vegetated stream banks,Breeding Adult-Inland Wetlands: Swamps,Breeding

Adult-Inland Wetlands: Marsh,Breeding Adult-Inland Wetlands: Slough/bayou,Breeding Adult-Inland Wetlands: Ditch,Breeding Adult-Inland Wetlands: Pond/lake/reservoir,Breeding Adult-Inland Wetlands: Typha-scirpus marsh,Breeding Adult-Ecotones: Old field/water,Breeding Adult-Ecotones: Crop field/water,Breeding Adult-Ecotones: Grassland/water,Breeding Adult-Human Association: Wildlife refuges/sanctuaries,Egg-Aquatic Habitat Zonation: Littoral zone inhabitant,Egg-Water Level: Permanently flooded,Egg-Inland Wetlands: Marsh,Egg-Human Association: Wildlife refuges/sanctuaries,Feeding Adult-Biodegradable Organics: Clean waters not exposed to pollution,Feeding Adult-Substrate Type: Plants,Feeding Adult-Aquatic Vegetation Density: High,Feeding Adult-Aquatic Habitat Zonation: Littoral zone inhabitant,Feeding Adult-Water Level: Permanently flooded,Feeding Adult-Water Depth: < 1 ft.,Feeding Adult-Coastal Zone: Mudflats,Feeding Adult-Inland Wetlands: Inland shallow fresh marshes,Feeding Adult-Inland Wetlands: Vegetated stream banks,Feeding Adult-Inland Wetlands: Swamps,Feeding Adult-Inland Wetlands: Marsh,Feeding Adult-Inland Wetlands: Slough/bayou,Feeding Adult-Inland Wetlands: Ditch,Feeding Adult-Inland Wetlands: Typha-scirpus marsh,Feeding Adult-Ecotones: Old field/water,Feeding Adult-Ecotones: Crop field/water,Feeding Adult-Ecotones: Grassland/water,Feeding Adult-Human Association: Wildlife refuges/sanctuaries,Feeding Juvenile-Biodegradable Organics: Clean waters not exposed to pollution,Feeding Juvenile-Aquatic Habitat Zonation: Littoral zone inhabitant,Feeding Juvenile-Water Level: Permanently flooded,Feeding Juvenile-Water Depth: < 1 ft.,Feeding Juvenile-Coastal Zone: Mudflats,Feeding Juvenile-Inland Wetlands: Inland shallow fresh marshes,Feeding Juvenile-Inland Wetlands: Vegetated stream banks,Feeding Juvenile-Inland Wetlands: Swamps,Feeding Juvenile-Inland Wetlands: Marsh,Feeding Juvenile-Inland Wetlands: Slough/bayou,Feeding Juvenile-Inland Wetlands: Ditch,Feeding Juvenile-Inland Wetlands: Typha-scirpus marsh,Feeding Juvenile-Ecotones: Old field/water,Feeding Juvenile-Ecotones: Crop field/water,Feeding Juvenile-Ecotones: Grassland/water,Feeding Juvenile-Human Association: Wildlife refuges/sanctuaries,General-Biodegradable Organics: Clean waters not exposed to pollution,General-Substrate Type: Plants,General-Bottom Type [Aquatic]: Mud/silt,General-Aquatic Vegetation Density: High,General-Aquatic Habitat Zonation: Littoral zone inhabitant,General-Water Level: Permanently flooded,General-Water Depth: < 1 ft.,General-Water Depth: 1-5 ft.,General-Soil Moisture: Wet,General-Terrestrial Features: Bare ground,General-Coastal Zone: Mudflats,General-Inland Wetlands: Seasonally flooded with emergent vegetation,General-Inland Wetlands: Inland shallow fresh marshes,General-Inland Wetlands: Inland deep fresh marshes,General-Inland Wetlands: Inland open fresh water,General-Inland Wetlands: Vegetated stream banks,General-Inland Wetlands: Swamps,General-Inland Wetlands: Marsh,General-Inland Wetlands: Slough/bayou,General-Inland Wetlands: Ditch,General-Inland Wetlands: Typha-scirpus marsh,General-Ecotones: Old field/water,General-Ecotones: Crop field/water,General-Ecotones: Grassland/water,General-Grasses: Oats,General-Grasses: Wheat,General-Human Association: Wildlife refuges/sanctuaries,Limiting-Aquatic Vegetation Density: Low,Limiting-Gradient: High,Limiting-Water Level: Seasonal/Alternately flooded,Resting Adult-Aquatic Habitat Zonation: Littoral zone inhabitant,Resting Adult-Water Level: Permanently flooded,Resting Adult-Coastal Zone: Mudflats,Resting Adult-Inland Wetlands: Inland shallow fresh marshes,Resting Adult-Inland Wetlands: Vegetated stream banks,Resting Adult-Inland Wetlands: Swamps,Resting Adult-Inland Wetlands: Marsh,Resting Adult-Inland Wetlands: Slough/bayou,Resting Adult-Inland Wetlands: Ditch,Resting Adult-Inland Wetlands: Typha-scirpus marsh,Resting Adult-Ecotones: Grassland/water,Resting Adult-Human Association: Wildlife refuges/sanctuaries,Resting Juvenile-Aquatic Habitat Zonation: Littoral zone inhabitant,Resting Juvenile-Coastal Zone: Mudflats,Resting Juvenile-Inland Wetlands: Inland shallow fresh marshes,Resting Juvenile-Inland Wetlands: Vegetated stream banks,Resting Juvenile-Inland Wetlands: Swamps,Resting Juvenile-Inland Wetlands: Marsh,Resting Juvenile-Inland Wetlands:

R.ENVIRON = "88,430,431,451,475,528,772,1227,4876,7969,11149,11150,11152,111538872"

R.ENVIRON.LIM = "430,451,475,528,772,11153"

*C.ENVIRON = "THIS SPECIES WILL MIGRATE TO THE GULF COAST IN THE WINTER *4876*. IT IS TYPICALLY A BIRD OF FRESHWATER MARSHES BUT KNOWN TO INHABIT OR UTILIZE A WIDE VARIETY OF HABITATS AS LONG AS THE TERRAIN SUPPORTS A REASONABLE AMOUNT OF VEGETATION AND IS FREQUENTLY WET *11153*. FRESHWATER WETLANDS ARE A SERIOUS LIMITING FACTOR TO THE KING RAIL AND ALL SPECIES THAT DEPEND ON THEM *11153*. THE AFFECT OF PESTICIDES ON THE KING RAIL OR ITS FOOD RESOURCES IS UNKNOWN *11153*. BREEDING OCCURES ON COASTAL AND INLAND BRACKISH TO FRESHWATER MARSHES WITH ABUNDANT VEGETATION. THEY ARE NOT KNOWN TO BREED IN SALT MARSHES. WINTERING IS ON COASTAL BRACKISH, SALT, AND FRESHWATER MARSHES *475*. SPECIAL HABITAT REQUIREMENTS INCLUDE ADEQUATE*

VEGETATION AND FAIRLY CONSTANT WATER LEVELS THROUGHOUT THE BREEDING SEASON *475*."
R.ENVIRON.E = "4876"
C.ENVIRON.E = "THE EGGS ARE FOUND IN PERMANENT WETLANDS *4876*."
R.ENVIRON.FJ = "1217,4876,5416,5843,5844"
C.ENVIRON.FJ = "THEY ARE FOUND IN PERMANENT WETLANDS DURING THE BREEDING SEASON *4876*. THE PREFERED WATER DEPTH IS SHALLOW. THEY USUALLY FEED IN AREAS WELL CONCEALED BY PLANT COVER, OR IN OPEN AREAS WHERE THEY BLEND WELL WITH THE SURROUNDINGS *4876,5416*. THIS SPECIES WILL FEED EXTENSIVELY IN RICE FIELDS IN ARIZONA *5416,4876*. THEY FEED IN ROADSIDE DITCHES, RICE FIELDS, AND CATTAIL MARSHES IN ARIZONA *4876*. RICE FIELDS ARE THE OPTIMUM HABITAT IN ARIZONA FROM EARLY SUMMER TO MID-FALL *5415*."
R.ENVIRON.RJ = "1217,4876,5415,5842,5844,6804"
C.ENVIRON.RJ = "IT IS ASSUMED THAT THEY REST UNDER THE COVER OF DENSE AQUATIC VEGETATION IN THE NEAR NEST. IN ARIZONA, THEY USE CATTAIL AS COVER IF IT IS PRESENT *4876*. THEY ALSO USE VEGETATION ON DITCH BANKS AS A RETREAT *4876,1217*. IN ARIZONA, RICE FIELDS ARE THE OPTIMUM HABITAT FROM EARLY SUMMER TO MID-FALL *5415*."
R.ENVIRON.FA = "430,451,475,528,1217,4876,5416,5843,5844,11152,11153,7721217"
C.ENVIRON.FA = "THIS SPECIES FEEDS IN A MARSH AND PRAIRIE INTERFACE *4876*. THEY FEED IN MARSH VEGETATION WITH VERY SHALLOW WATER (2 TO 3 INCHES) AND MUDFLATS EXPOSED BY LOW TIDE *475*. THE PREFERED WATER DEPTH IS SHALLOW. THEY USUALLY FEED IN AREAS WELL CONCEALED BY PLANT COVER, OR IN OPEN AREAS WHERE THEY BLEND WELL WITH THE SURROUNDINGS *4876,5416*. THEY FEED EXTENSIVELY IN RICE FIELDS IN ARIZONA *5416,4876*. THIS SPECIES WILL FEED IN ROADSIDE DITCHES, RICE FIELDS, AND CATTAIL MARSHES IN ARIZONA *4876*. RICE FIELDS ARE THE OPTIMUM HABITAT IN ARIZONA FROM EARLY SUMMER TO MID-FALL *5415*."
R.ENVIRON.RA = "1217,4876,5415,5842,5844,6804"
C.ENVIRON.RA = "THIS SPECIES OCCURS IN THE MARSH AND PRAIRIE INTERFACE *4876*. IT IS ASSUMED THAT THEY REST UNDER THE COVER OF DENSE AQUATIC VEGETATION NEAR THE NEST DURING BREEDING THE SEASON AND UNDER OR NEAR COVER FOR THE REMAINDER OF THE TIME *6804*. IN ARIZONA, THEY USE CATTAIL AS COVER, IF PRESENT *4876*. THEY ALSO USE VEGETATION ON DITCH BANKS AS A RETREAT *4876,1217*. IN ARIZONA, RICE FIELDS ARE THE OPTIMUM HABITAT FROM EARLY SUMMER TO MID-FALL *5415*."
R.ENVIRON.BA = "431,507,4840,4876,4957,5806,5842,5844,5921,6175,6285,8872,11153,48765415"
C.ENVIRON.BA = "THIS SPECIES BREEDS IN THE MARSH PRAIRIE INTERFACE *4876*, ON FRESH OR BRACKISH WATER WITH ABUNDANT VEGETATION *475*. THE NEST IS USUALLY PLACED ABOVE OR NEAR THE WATER IN A CLUMP OR TUSSOCK OF THICK VEGETATION OR FRESHWATER PLANTS *431,4876*. FRESHWATER MARSHES, PONDS, SLOUGHS, MARSHY EDGES OF LAKES, SLUGGISH STREAMS AND ROADSIDE DITCHES ARE POPULAR NESTING PLACES *8872*. THE PREFERED WATER DEPTH IS SHALLOW. IN IOWA, 4|6 OF THE NESTS FOUND WHERE LAKE SEDGE PREDOMINATED *4957*. IN IOWA, THE WATER DEPTH AT THE NEST SITE IS 10.6 INCHES (MEAN) *5921*. IN ARIZONA, THIS SPECIES NESTS ABOVE 2 TO 3 INCHES OF WATER *5415*. IN ANOTHER STUDY, THE WATER DEPTH AT THE NEST SITE WAS 4 TO 18 INCHES. IN OHIO THE WATER DEPTH WAS 2 FEET, AND IN ARIZONA 6 TO 8 INCHES *4876*. IN KANSAS, THEY WERE OBSERVED MOST IN BULRUSH IN 4 TO 6 INCHES OF WATER *5806*. IN ARIZONA, THE NESTS WERE MAINLY IN ROADSIDE DITCHES, CANALS, OAT FIELDS, AND FALLOW LAND *5415*. IN ARIZONAN THIS SPECIES NESTS IN CATTAIL, SEDGE, RUSHES, AND RICE, USUALLY IN FAIRLY UNIFORM STANDS OF VEGETATION *5415*. IN ARIZONA, RICE FIELDS ARE THE OPTIMUM HABITAT, FROM THE TIME OF WATERING IN EARLY SUMMER UNTIL HARVEST IN MID-FALL *5415*."
LIFE.HIST = "PHYSICAL DESCRIPTION: THIS IS A LARGE BIRD, FROM 15 TO 19 INCHES IN LENGTH (THE SIZE OF CHICKEN). THE HEAD, NECK, AND UNDERPARTS ARE RUST, BLACK AND MOTTLED BROWN. THEY HAVE A LONG SLIGHTY CURVED BILL *528,451*. |REPRODUCTION: THIS SPECIES ARRIVES IN MINNESOTA IN MID APRIL, AND NESTING IS FROM THE 9TH TO THE 26TH OF JUNE. INCUBATION TAKES 21 TO 24 DAYS, AND BOTH SEXES INCUBATE FROM 5 TO 11 OVATE, SMOOTH, SLIGHTLY GLOSSY, PALE BUFF, SPARINGLY AND IRREGULARLY SPOTTED WITH DRAB OR BROWN, THERE IS ONLY ONE REPRODUCTIVE PERIOD IN MINNESOTA. THE AGE AT SEXUAL MATURITY IS UNKNOWN. DURING COURTSHIP, THE MALE GIVES A KIK-KIK-KIK OR JUPE-JUPE-JUPE CALL, AND WALKS WITH THE TAIL UPLIFTED AND COVERTS SHOWING. THE NEST IS MADE OF PLANTS (NARROW LEAVED EMERGENTS), IN SHALLOW MARSH COVERED BY A CANOPY. THE EGGS AVERAGE 41 BY 31 MM *475,430,700*. THIS SPECIES IS PRECOCIAL. THE NUMBER OF REPRODUCTIVE PERIODS PER YEAR IS 1, POSSIBLY 2 IN THE SOUTH *475*. THIS IS A SOLITARY NESTER. |BEHAVIOR; THE MALES BECOME VERY PUGNACIOUS, AND THEY DISPLAY BY WALKING ABOUT, WITH THE TAIL UPLIFTED, AND THE WHITE UNDERTAIL COVERTS EXTENDED. THE FEMALES DO NOT DISPLAY. COURTSHIP CONTINUES AFTER THE PAIR FORMATION. THE MALE

COMMONLY 'PRESENTS' FOOD TO FEMALE *1217,558*. THE EGGS ARE LAID IN A NEST MADE OF REEDS AND FLAGS CONCEALED IN GRASS OR SEDGE TUSSOCKS WHERE THE NESTS ARE BUILT UP ABOVE SHALLOW WATER. THE NESTS ARE OCCASSIONLY ON THE GROUND IN SLIGHT HOLLOWS SCRATCHED OUT IN A THICK CLUMP OF GRASS *430*. THEY BREED IN EXTENSIVE FRESHWATER MARSHES ALONG STREAMS, PONDS AND RIVERS, AND IN WET, GRASSY MEADOWS *430*. THE AVERAGE HEIGHT FROM THE GROUND TO THE CANOPY IN ARIZONA IS 17 INCHES TO THE RIM OF THE NEST *5415*. IN ARIZONA, THE NESTS ARE IN DRY LOCATIONS WITHIN 1 TO 2 INCHES FROM THE GROUND, BUT THEY MAY BE ELEVATED UP TO 1 FOOT, WHEN THE WATER FLUCTUATES *5415*. SOME RETURN TO SAME TERRITORY IN SUCCESSIVE YEARS *4876*. THEY BUILD A PLATFORM NEST WITH AN OUTER DIAMETER OF ABOUT 8 *507*. IN IOWA, THE MEAN DIMENSIONS WERE: HEIGHT 5.3, INSIDE DEPTH 0.4, OUTSIDE DIAMETER 11.5, INSIDE DIAMETER 8.4. *5921,4957*. THE DEFENSE IS INTRA- AND INTER-SPECIFIC *4876,1217*. THIS SPECIES WILL RETURN TO THE SAME TERRITORIES EVERY YEAR. THE TERRITORIES ARE STRIPS OF MARSH, 464 FEET LONG. THEY ARE DIURNAL, AND LEAVE MINNESOTA IN SEPTEMBER *4923*. TERRITORIALITY INCREASES DURING THE BREEDING SEASON, WITH LOWS IN THE WINTER. THE MALE ESTABLISHES AND DEFENDS THE TERRITORY *1217,475,776*. THE HOME RANGE SIZE HAS DENSITIES OF 3 NESTS PER 464 LINEAR FEET OF DITCH, 30 FEET WIDE, 30 BIRDS PER 100 ACRES OF MARSH, AND 1.69 ACRES PER NEST *475,776*. THIS SPECIES IS MOST ACTIVE PRIOR TO SUNRISE AND JUST AFTER SUNSET *430*. THEY LEAVE FOR THE WINTER GROUNDS IN LATE OCTOBER TO EARLY NOVEMBER (MAY WINTER IN VERY SOUTHEASTERN VIRGINIA AND WALLOPS ISLAND). THEY ARRIVE ON THE BREEDING GROUNDS IN MARCH OR APRIL *430,700*. THIS SPECIES PROBES WITH THE BILL, PECKING, AND IMMERSING THE HEAD AND NECK. THE PREFERED SUBSTRATE IS MARSH VEGETATION WITH VERY SHALLOW WATER (2 TO 3 INCHES), AND MUDFLATS EXPOSED BY LOW TIDE. IT FEEDS WITHIN THE BREEDING HABITAT BUT ALSO RANGES INTO NEARBY HAY AND GRAIN FIELDS *475*. THE NESTS ARE USUALLY 6 TO 18 INCHES HIGH, WOVEN OUT OF THE SURROUNDING VEGETATION AND CANOPIED. OFTEN, THEY NEST IN A HUMMOCK AMONG CATTAILS, MARSH GRASSES, RUSHES OR OTHER AQUATIC VEGETATION, WHERE THE STALKS AND LEAVES FORM A NATURAL CANOPY *451,475, 430*. THE YOUNG ARE ACTIVE RUNNERS FROM BIRTH *430*. BOTH SEXES INCUBATE THE EGGS *772*. IN ARKANSAS, THE TERRITORY CONSISTED OF SMALL STRIPS OF MARSH IN DITCHES, WITH THE BOUNDARIES FLUID DURING EARLY PAIRING ACTIVITY *1217,4876*. THE HEIGHT OF THE MIGRATION IS IN THE 1ST WEEK OF MAY, AND THEY ARE LAST SEEN SEPTEMBER 2ND *4957*. THE PAIR MAY REMAIN WITH THE BROOD MORE THAN 1 MONTH AFTER HATCHING *4876,5416*. THE HIGHEST DENSITY OF RAILS FOUND WERE WHERE THERE WAS ABUNDANT CRUSTACEANS *3787*. IN ARIZONA GRAND PRAIRIE, THERE WAS 1 NEST PER 15 ACRES ON RICE FIELDS AFTER THE HEIGHT OF THE NESTING SEASON *4876*. IN IOWA, THE MINIMUM DISTANCE BETWEEN OCCUPIED NESTS WAS 352 FEET, BETWEEN THE KING AND VIRGINIA RAIL 264 FEET AND BETWEEN THE KING AND SORA 102 FEET *5921*. ||LIMITING FACTORS: THE AMOUNT OF MARSHLAND AND WETLAND IN THE STATE IS A LIMITING FACTOR. THEY ARE A WEAK FLYER, AND PREFER TO SWIM OR RUN *430*. THIS SPECIES REQUIRES ADEQUATE VEGETATION FOR NESTING AND PROTECTION *475*. THE OAT HARVEST CULTIVATION DESTROY MANY NESTS AND YOUNG *5415*. |POPULATION PARAMETERS: MORTALITY RATES ARE UNKNOWN BUT HUNTING PRESSURE IS CONSIDERED TO BE LIGHT. THE RATE OF INCREASE IS UNKNOWN BUT POPULATIONS IN MINNESOTA ARE THOUGHT TO BE SMALL *4732*. THE SURVIVAL RATE UNTIL ABOUT 2 WEEKS OF AGE IS ABOUT 50% *4876*. |AQUATIC|TERRESTRIAL ASSOCIATIONS: THEY ARE ASSOCIATED WITH CATTAIL AND CRAYFISH *4876*. ENEMIES INCLUDE HUMAN HUNTERS, MOCCASIN SNAKE, MINK, BARRED OWL, AND THE GREAT HORNED OWL *430*. THEIR DISTRIBUTION COINCIDES CLOSELY WITH MUSKRAT, WHICH CREATES THE OPTIMUM HABITAT BY OPENING MARSHES AND PRODUCING A NETWORK OF PATHWAYS *4876*."

R.LIFE.HIST =

C.LIFE.HIST = "THE KING RAIL IS A NATIVE SPECIES, WHICH IS FOUND MAINLY IN THE EASTERN UNITED STATES AND SOUTH TO CUBA AND MEXICO. OCCURRENCE IN PENNSYLVANIA IS RARE DURING MIGRATION AND OCCASIONAL DURING SUMMER AND WINTER."

MANAGEMENT = "ADVERSE-Draining wetlands, marshes, ponds, lakes,ADVERSE-CHANNELIZATION,ADVERSE-CONSTRUCTION OF NAVIGATIONAL IMPROVEMENTS (DAMS, LOCKS, ETC.),ADVERSE-DREDGING,ADVERSE-DEPOSITION OF FILL,ADVERSE-LOCATING|CONSTRUCTING ROADS,ADVERSE-SURFACE MINING,ADVERSE-APPLYING HERBICIDES,ADVERSE-APPLYING PESTICIDES,ADVERSE-APPLYING INSECTICIDES,ADVERSE-CLEAN FARMING,BENEFICIAL-REGULATE NUMBERS AND SEX OF HARVEST,BENEFICIAL-RESTRICTING|REGULATING HUMAN USE OF HABITATS,BENEFICIAL-RESTRICTING|REGULATING HUMAN DISTURBANCE OF POPULATIONS,BENEFICIAL-MAINTAINING UNDISTURBED|UNDEVELOPED AREAS,BENEFICIAL-MAINTAINING EARLY STAGES OF ECOLOGICAL SUCCESSION,BENEFICIAL-MAINTAINING NATURAL ECOLOGICAL SUCCESSION,BENEFICIAL-MAINTAINING WILDNERNESS ENVIRONMENT,BENEFICIAL-Maintaining special habitat features [wetlands, caves, etc.],BENEFICIAL-,BENEFICIAL-Developing|maintaining water holes, ponds, potholes, etc.,BENEFICIAL-ESTABLISHING|MAINTAINING NESTING AND ESCAPE COVER,BENEFICIAL-DEVELOPING|MAINTAINING DITCHBANK VEGETATION,BENEFICIAL-DEVELOPING|MAINTAINING STREAM BANK VEGETATION,BENEFICIAL-CREATING IMPOUNDMENTS,BENEFICIAL-SEEDING

AQUATIC PLANTS,BENEFICIAL-MAINTAINING|PROTECTING RIPARIAN HABITATS,BENEFICIAL-DEVELOPING|MAINTAINING BRACKISH MARSH,BENEFICIAL-DEVELOPING|MAINTAINING FRESHWATER MARSH,BENEFICIAL-DEVELOPING|MAINTAINING MUDFLATS,BENEFICIAL-Maintaining bogs,BENEFICIAL-Developing|maintaining|protecting wetlands,BENEFICIAL-Controlling sedimentation,BENEFICIAL-Controlling pollution [thermal, chemical, physical],BENEFICIAL-Controlling water levels,BENEFICIAL-NO-TILL FARMING,BENEFICIAL-Retaining crop residue [over winter],BENEFICIAL-Restoration of wetlands,-"

R.MGT.B = "430,528,4469,4923,5862,6804,11153"

R.MGT.A = "430,528,558,4469,4923,5862,6804,11153"

R.MGT.E = "6804,11154"

C.MGT = "EXTENSIVE MARSHLANDS MUST BE PRESERVED FOR THE BENEFIT OF THIS SPECIES *430,528*. AVOID INTENSIVE AGRICULTURAL AND RECREATIONAL USES, REMOVAL OF VEGETATION ON STREAMSIDES, URBAN DEVELOPMENT, AND MAN CAUSED FLUCTUATION IN WATER LEVEL DURING BREEDING SEASON *528,430*. DRAWDOWNS SHOULD BE TIMED SO THAT SOME WATER IS AVAILABLE THROUGH THE NESTING PERIOD *5803*. IN OHIO, RAILS OCCUPIED STANDS OF NODDING SMARTWEED, WILD MILLET AND REDROOT CYPERUS IN UNITS REFLOODED WITH 6 TO 24 WATER IN MID-AUGUST *5803*. IN SOUTHEAST MISSOURI, RAILS AND SHOREBIRDS WERE SELECTIVELY ATTRACTED TO MAN-MADE WETLANDS. SHALLOW FLOODING (5 TO 15CM) OF MOIST SOIL PLANTS IN SEPTEMBER TO OCTOBER AND LATE MARCH TO EARLY MAY ATTRACTED SORAS AND VIRGINA RAILS. MANAGEMENT FOR SPRRING MIGRANTS IS SUCCESSFUL ONLY IN VEGETATION TYPES THAT PROVIDE EMERGENT COVER, AND PLANT SPECIES COMPOSITION APPEARED TO HAVE LITTLE IMPACT. FOR SPRING MIGRANTS, YOU NEED LATE FALL AND WINTER DRAWDOWN OF EARLY SUCCESSIONAL ANNUAL GRASSES, OR A SELECTION OF LATER SUCCESSIONAL STAGE SEDGES, RUSHES, AND WOODY SHRUBS. RAIL AND SHOREBIRD MANAGEMENT ARE MUTUALLY EXCLUSIVE. THE REGULAR USE OF ONE IMPOUNDMENT BY BOTH RAILS AND SHOREBIRDS MIGHT BE OBTAINED IN THE FALL BY DISKING A HIGHER ELEVATION OF UNIT AND LEAVING THE VEGETATION STANDING IN LOW AREAS. IF THE DISKED PORTIONS ARE THEN FLOODED TO THE APPROPRIATE DEPTH FOR SHOREBIRDS, THE WATER DEPTHS IN THE LOWER, VEGETATED PORTIONS WILL PROBABLY BE SUITABLE FOR RAILS. LATE SUMMER FLOODING FOR SOUTH BOUND RAILS EFFECTIVELY SET BACK SUCCESSION ON ONE PLOT. THE SUGGESTED PHENOLOGIC CLUES FOR MANAGEMENT IN SOUTHEAST MISSOURI ARE: MANIPULATIONS TO ATTRACT SPRING MIGRANTS SHOULD BE UNDERWAY WHEN E. COTTONWOOD AND RED MAPLE REACH PEAK BLOOMING, AREAS FLOODED FOR SPRING RAILS CAN BE DEWATERED WHEN F. DOGWOOD FINISHED BLOOMING, IMPOUNDMENTS FOR SOUTHBOUND RAILS SHOULD BE FLOODED AS AMERICAN LOTUS& TRUMPET CREEPER COMPLETE BLOSSOMING, AND CAN BE DEWATERED WHEN GOLDENROD BLOSSOMS DEGENERATE *5631*."

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APPENDIX H.

Updated Species Profile of the Striped bass.

010006

CAT = "01"
NAME = "BASS, STRIPED"
PHYLUM = "CHORDATA"
CLASS = "OSTEICHTHYES"
ORDER = "PERCIFORMES"
FAMILY = "PERCICHTHYIDAE"
GENUS = "MORONE"
SPECIES = "SAXATILIS"
AUTHORITY = "(WALBAUM)"
R.TAXONOMY = "795,816,842,1246,8285,9540,10864"
C.TAXONOMY = "THIS SPECIES IS IN THE FAMILY OF TEMPERATE BASSES AND APPEARS IN EARLIER LITERATURE AS ROCCUS LINEATUS *816,795*."
STATUS = "123,401"
T.STATUS = "SPORT FISH,COMMERCIAL"
C.STATUS = "THE STRIPED BASS, MORONE SAXATILIS (WALBAUM, 1792), IS AN IMPORTANT COMMERCIAL AND SPORT FISH OVER MUCH OF ITS RANGE (01:697). IT IS AN ANADROMOUS ATLANTIC COASTAL SPECIES, HOWEVER, IT HAS BEEN WIDELY TRANSPLANTED (02:576). ATLANTIC COAST STOCKS HAVE DECLINED GREATLY SINCE THE 1970'S PROMPTING FEDERAL ACTION IN THE FORM OF THE ATLANTIC STRIPED BASS CONSERVATION ACT OF 1984. THIS ACT ALLOWS FEDERAL IMPOSITION OF A MORATORIUM ON FISHING IN STATES NOT COMPLYING WITH THE INTERSTATE FISHERIES MANAGEMENT PLAN FOR STRIPED BASS, WRITTEN BY THE ATLANTIC STATES MARINE FISHERIES COMMISSION (03:1-4). SOME STATES HAVE INSTITUTED AT LEAST PARTIAL MORATORIA ON STRIPED BASS FISHING AS A RESULT OF DECLINING STOCKS (03:42). IN 1982 AND 1983 THE NATIONAL MARINE FISHERIES SERVICE WAS PETITIONED TO LIST THE CHESAPEAKE STOCK OF STRIPED BASS ON THE FEDERAL ENDANGERED AND THREATENED SPECIES LIST. HOWEVER, THE LISTING WAS DECLINED BOTH TIMES (03:4-5). IN PENNSYLVANIA, THE STRIPED BASS IS CONSIDERED A GAME FISH, AND COMMERCIAL HARVEST IS ILLEGAL (03:42). IN THE DELAWARE RIVER AND ESTUARY, RECREATIONAL FISHING IS PERMITTED, WITH A 33" MINIMUM SIZE AND 2 FISH/DAY LIMITS (04:34). INLAND WATER LIMITS ARE 15" MINIMUM SIZE AND 2 FISH/DAY (04:31). MANAGEMENT JURISDICTION OF THE ATLANTIC STRIPED BASS IS PRIMARILY THE RESPONSIBILITY OF THE INDIVIDUAL STATES (03:35) (WITHIN THE GUIDE LINES OF THE ATLANTIC STRIPED BASS CONSERVATION ACT). THE PENNSYLVANIA FISH COMMISSION HAS RESPONSIBILITY IN WATERS OF THE COMMONWEALTH (03:42)."
T.OCCUR.COUNTY =
SEAS.OCCUR = "O,E,X,X,E,O,X,O,O,X,E,E,X,E,O,O,O"
T.ABS.COUNTY =
T.ABUND.CTY = "Abundance is unknown,Medium abundance,Abundance is unknown,Abundance is unknown,Medium abundance,Abundant,Abundance is unknown,Low abundance,Low abundance,Abundance is unknown,Abundance is unknown,Medium abundance,Abundance is unknown,Medium abundance,Medium abundance,Medium abundance,Low abundance"
T.HYDRO.CODE = "UPPER DELAWARE: UPPER DELAWARE,UPPER DELAWARE: LACKAWAXEN,UPPER DELAWARE: MIDDLE DELAWARE-MUSCONETCONG,LOWER DELAWARE: CROSSWICKS-NESHAMINY,LOWER DELAWARE: LOWER DELAWARE,LOWER DELAWARE: SCHUYLKILL,LOWER SUSQUEHANNA: RAYSTOWN,LOWER SUSQUEHANNA: LOWER JUNIATA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA-SWATARA,LOWER SUSQUEHANNA: LOWER SUSQUEHANNA,UPPER OHIO: SHENANGO"
T.QUAD.CODE = "WOODBURY,BRIDGEPORT,MARCUS HOOK,CAMDEN,PHILADELPHIA,CONOWINGO DAM,WAKEFIELD,HOLTWOOD,CONESTOGA,SAFE HARBOR,BRISTOL,BEVERLY,TRENTON EAST,TRENTON
HABITAT = "AQUATIC"
R.HABITAT = "1187,1310,5199,5654,6111,6289,9685,61042545"
R.RIPARIAN = "1310,9685"

LAND.USE = "51,52,53"
T.LAND.USE = "WATER: STREAMS-CANALS,WATER: LAKES,WATER: RESERVOIRS"
R.LAND.USE = "1187,1310,4903,4910,5080,5199,5654,5676,6040,6111,6289,9685,61041187"
WETLANDS = "Estuarine: intertidal-Beach|bar: sand,Lacustrine: limnetic-,Lacustrine: limnetic-,Lacustrine: littoral-,-"
R.NWI = "1187,5080,5199,5665,6289,7667,7933,56766054"
C.HAB.ASSOC = "STRIPED BASS ARE KNOWN FROM A WIDE VARIETY OF HABITATS. ORIGINALLY AN ANADROMNS SPECIES OF THE ATLANTIC COAST, IT HAS SINCE BEEN TRANSPLANTED TO THE PACIFIC COAST AND INTO LAKES AND IMPOUNDMENTS THROUGH OUT THE UNITED STATES*9685*."
HEP = "RIVERINE V1 PERCENT NATURAL RIVER DISCHARGE DURING SPAWNING: MAXIMUM UNKOWN, MINIMUM HABITAT SUITABILITY DECREASES IN PROPORTION TO THE REDUCTION IN DISCHARGE, OPTIMUM 100%. RIVERINE V2 MAXIMUM TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATION DURING SPAWNING: MAXIMUM 5 PPT (PARTS PER THOUSAND), MINIMUM 0 PPT, OPTIMUM 0 TO 0.18 PPT. RIVERINE V3 AVERAGE WATER TEMPERATURE DURING THE SPAWNING SEASON AND PERIOD OF EGG DEVELOPMENT: MAXIMUM 22 C, MINIMUM 13 C, OPTIMUM 17 TO 19 C. RIVERINE AND ESTUARINE V4 MINIMUM DISSOLVED OXYGEN LEVEL DURING EGG AND LARVAL DEVELOPMENT: MAXIMUM UNKNOWN, MINIMUM 1 MG|L, OPTIMUM MORE THAN 5 MG|L. RIVERINE V5 AVERAGE CURRENT VELOCITY IN WATER COLUMN DURING PERIODS OF EGG DEVELOPMENT: MAXIMUM UNKNOWN, MINIMUM 29 CM|S, OPTIMUM 31 TO 34 CM|S. ESTUARINE V6 PERCENT ORIGINAL SALT MARSH IN ESTUARY: MAXIMUM 100%, MINIMUM 0%, OPTIMUM 100%. ESTUARINE V7 PERCENT OF ORIGINAL FRESHWATER INPUT (AVERAGE VOLUME) TO ESTUARY DURING THE LATE WINTER AND SPRING HIGH FLOW PERIOD: MAXIMUM 100%, MINIMUM 0%, OPTIMUM 100%. ESTUARINE V8 AVERAGE WATER TEMPERATURE DURING PERIOD OF LARVAL DEVELOPMENT: MAXIMUM 23 C, MINIMUM 12 C, OPTIMUM 18 C TO 21 C. ESTUARINE V9 AVERAGE SALINITY DURING PERIODS OF LARVAL DEVELOPMENT: MAXIMUM 15 PPT, MINIMUM 0 PPT, OPTIMUM 3 TO 7 PPT. ESTUARINE V10 AVERAGE DISSOLVED OXYGEN DURING THE GROWING SEASON: MAXIMUM UNKNOWN, MINIMUM 1 MG|L, OPTIMUM MORE THAN 5 MG|L. ESTUARINE V11 AVERAGE WATER TEMPERATURE DURING GROWING SEASON: MAXIMUM 27.5 C, MINIMUM 10 C, OPTIMUM 14 TO 22 C *2545*."
R.HEP = "2545"
C.HEP = "THE HABITAT SUITABILITY FOR ADULTS IS LIMITED PRIMARILY BY WATER QUALITY *2545*. THE ASUSMPTION FOR RIVER DISCHARGE DURING SPAWNING IS THAT THE OPTIMAL DISCHARGE IS 100% OF THE NATURAL RIVER DISCHARGE FOR THE SPAWNING TIME PERIOD. DISCHARGES OF GREATER THAN 100% ARE NOT THOUGHT TO REDUCE SUITABILITY FOR SPAWNING. REDUCTIONS IN DISCHARGE ARE ASSUMED TO RESULT IN PROPORTIONAL REDUCTIONS IN HABITAT SUITABILITY *2545*. THIS MODEL DOES NOT APPLY TO MARINE ENVIRONMENTS *2545*."
TROPHIC = "CARNIVORE"
R.TROPHIC = "2545,7667,8560,9685"
FOOD.HABITS =
R.FOOD.G = "795,2545,6595,7448,7667,7933,8560"
R.FOOD.I = "2545,6595,7667,8560"
C.FOOD = "THE INITIAL FEEDING OF THE LARVA REQUIRES A CONCENTRATION OF 1864 NAUPULII PER LITER *2545*. EARLY INSTARS OF COPEPODS ARE PREFERRED UP TO 10 MM IN LENGTH *795*."
R.FOOD.L = "795,5219,5581,5988,7458"
C.FOOD.L = "THERE ARE FEW STUDIES DONE ON THE NATURAL DIET OF THE LARVAE *9685*. ABOUT TWO WEEKS AFTER HATCHING, THE LARVAE FORAGE NEAR THE BOTTOM *7458*. THEY ARE SUCCESSFULLY CULTURED IN ILLINOIS ON BRINE SHRIMP (ARTEMIA) NAUPULII *9685*. THE 10 TO 30 MM SIZE CLASS TAKE ADULT COPEPODS, CLODOCERAUS, AND INSECT LARVAE *795*. AT 30 TO 80 MM IN SIZE, CLADOCERANS AND INSECT LARVAE MAKE UP THE MAJOR PORTION OF THE DIET *795*. AT 80 TO 100 MM IN SIZE, THE MOST IMPORTANT FOOD ITEMS ARE INSECT LARVAE *795*."
R.FOOD.J = "5157,5219,5253,5678,5689,5716,7448,7667,8942,52025649"
C.FOOD.J = "JUVENILES APPEAR TO BE OPPORTUNISTIC FEEDERS. THE DIET VARIES WITH LOCALITY *7667*. THE DIET IS LARGELY COMPOSED OF SMALL CRUSTACEANS *7667,5219*. IN A CALIFORNIA LAKE, THREADFIN SHAD MADE UP 45% (BY VOLUME) OF THE DIET *5157*. IN OKLAHOMA CULTURE PONDS, BASS 10 TO 30 MM (STANDARD LENGTH) ATE MAINLY COPEPODS, AND BASS GREATER THAN 30 MM ATE MORE CLADOCERA AND INSECTS. FISH WERE NOT INCLUDED IN THE DIET UNTIL THE BASS REACHED 69 MM, AND WERE NOT AN IMPOORTANT PART OF THE DIET UNTIL THE BASS REACHED 90 MM *5202*. IN VIRGINIA CULTURE PONDS, CLADOCERANS, COPEPODS, AND INSECTS ARE IMPORTANT.

CLADOCERAN WERE ABUNDANT IN THEIR STOMACHS AND INCREASED WHEN THE BASS REACHED 30 TO 40 MM (TOTAL LENGTH) *5253*."
R.FOOD.A = "5065,5079,5157,5427,5578,5649,6595,7448,7667,8560,8942,9205,10756,65956288"
C.FOOD.A = "IN AN OKLAHOMA RESEVOIR, GIZZARD SHAD MADE UP 83.4% OF THE DIET, AND 84.6% OF THE DIET IN THE TAILWATER *6288*. IN A CALIFORNIA LAKE, THREADFIN SHAD MADE UP 94% OF THE DIET *5157*. NUMEROUS STUDIES HAVE BEEN MADE OF ADULT FOOD HABITS. THE DOMINANT PREY DEPENDS ON THE HABITAT AND AVAILABILITY *7667*. IN INLAND WATER, STRIPED BASS ARE CHIEFLY PISCIVOROUS (MAINLY CLUPEIDS), EXCEPT DURING THE LATE SPRING WHEN MAYFLIES WERE THE DOMINANT FOOD ITEMS *6595*."
ENVIRON.ASSOC = "Breeding Adult-Turbidity: Clear water,Breeding Adult-Substrate Type: Mud|silt,Breeding Adult-Substrate Type: Sand,Breeding Adult-Bottom Type [Aquatic]: Rubble,Breeding Adult-Water Velocity: 3.0-3.5 fps,Breeding Adult-Water Level: Permanently flooded,Breeding Adult-Water Depth: 1-5 ft.,Breeding Adult-Water Depth: 5-10 ft.,Breeding Adult-Water Depth: 10-25 ft.,Breeding Adult-Inland Wetlands: Permanent stream,Egg-Dissolved Oxygen: High [> 7 mg|l] concentrations,Egg-Water Velocity: > 3.5 fps,Egg-Water Level: Permanently flooded,Egg-Water Depth: 5-10 ft.,Feeding Adult-Dissolved Oxygen: High [> 7 mg|l] concentrations,Feeding Adult-Substrate: Unattached,Feeding Adult-Aquatic Habitat Zonation: Open water zone,Feeding Adult-Water Level: Permanently flooded,Feeding Adult-Water Depth: 10-25 ft.,Feeding Adult-Inland Wetlands: Pond|lake|reservoir,Feeding Juvenile-Dissolved Oxygen: High [> 7 mg|l] concentrations,Feeding Juvenile-Substrate: Unattached,Feeding Juvenile-Bottom Type [Aquatic]: Sand,Feeding Juvenile-Water Level: Permanently flooded,Feeding Juvenile-Salinity: Salt concentrations 500-30,000 mg|l,Feeding Juvenile-Inland Wetlands: Permanent stream,Feeding Juvenile-Inland Wetlands: Pond|lake|reservoir,Feeding Larva-Water Temperature: 15-21 degrees C,Feeding Larva-Dissolved Oxygen: Moderate [5-7 mg|l] concentrations,Feeding Larva-Water pH: 6.5-8.5,General-Water Temperature: 15-21 degrees C,General-Dissolved Oxygen: High [> 7 mg|l] concentrations,General-Dissolved Oxygen: Moderate [5-7 mg|l] concentrations,General-Water pH: 6.5-8.5,General-Substrate Type: Mud|silt,General-Substrate Type: Sand,General-Substrate: Unattached,General-Water Velocity: > 3.5 fps,General-Salinity: Salt concentrations 500-30,000 mg|l,General-Water Depth: 1-5 ft.,General-Water Depth: 5-10 ft.,General-Water Depth: 10-25 ft.,Limiting-Water Temperature: > 27 degrees C,Limiting-Water Temperature: 15-21 degrees C,Limiting-Water Temperature: < 15 degrees C,Limiting-Dissolved Oxygen: Moderate [5-7 mg|l] concentrations,Limiting-Total Dissolved Solids: < 5,000 ppm,Resting Adult-Aquatic Habitat Zonation: Open water zone,Resting Adult-Water Level: Permanently flooded,Resting Adult-Inland Wetlands: Pond|lake|reservoir,Resting Juvenile-Bottom Type [Aquatic]: Sand,Resting Juvenile-Water Level: Permanently flooded,Resting Juvenile-Inland Wetlands: Permanent stream,Resting Juvenile-Inland Wetlands: Pond|lake|reservoir,Resting Larva-Water Level: Permanently flooded,-"
R.ENVIRON = "795,1641,6595,7448,7667,7933,9685,9784"
R.ENVIRON.LIM = "795,1641,2545,7667,8560,9685"
C.ENVIRON = "THE OPTIMAL RIVER FLOW IS 100% OF THE NATURAL FLOW *2545*. THE MINIMUM VELOCITES NEEDED TO MAINTAIN SUSPENSION OF THE EGGS IS 30 CM|SECOND *2545*. THE OPTIMAL RANGE OF TOTAL DISSOLVED SOLIDS IS FROM 100 TO 900 PPM *795*."
R.ENVIRON.E = "5392,5450,5752,5871,6040,6127,7667,9784,10757,48645822"
C.ENVIRON.E = "EGGS STAND A GREATER CHANCE OF SURVIVAL WHEN D.O. CONCENTRATIONS ARE GREATER THAN 5 MG|LITER *7667*. A SUFFICIENT FLOW IS NEEDED TO KEEP THE EGGS SUSPENDED IN THE WATER COLUMN UNTIL HATCHING *1187*. IN A CALIFORNIA LAB STUDY, 88% OF THE EGGS HATCHED AT A WATER TEMPERATURE OF 55 DEGREES F, 85% AT 62 TO 64 DEGREES F, AND 97% AT 67 TO 69 DEGREES F *6040*. THE OPTIMAL TEMPERATURE FOR HATCHING IN ANOTHER LAB STUDY WAS 10 DEGREES C *5450*. APPARENTLY A CURRENT OF AT LEAST 1 FOOT|SECOND IS REQUIRED TO KEEP THE EGGS IN SUSPENSION *6040*. THE EGGS MUST BE KEPT IN SUSPENSION DURING INCUBATION *6040,5752,5392*. IN A CALIFORNIA LAB STUDY, THE EGGS SEEMED TO HATCH BETTER WHEN EXPOSED TO SUNLIGHT *6040*."
R.ENVIRON.FL = "795,4864,5450,5664,5871,6040,6051"
C.ENVIRON.FL = "THE OPTIMAL RANGE OF TOTAL DISSOLVED SOLIDS IS FROM 100 TO 900 PPM *795*. TOXIC LEVELS OF ZINC ARE 0.28 PPM, COPPER 0.05 PPM, AND ALUMINUM 0.02 PPM *795*. FROM 0 TO 10% SALINITY IS OPTIMAL FOR THE SURVIVAL OF LARVAE *5450*. IN A NORTH CAROLINA LAB STUDY, THE FRY FROM EGGS INCUBATED AND HATCHED IN WATER AT 70 DEGREES F SHOWED NO MORTALITY. IN A 76 HOUR PERIOD AFTER HATCHING, THE PERCENT OF NORMAL FRY DECREASED WITH INCREASED WATER TEMPERATURES, AND AT 74 TO 80 DEGREES F, NO FRY SURVIVED *5664*. 97% OF THE LARVAE WERE ALIVE AFTER 72 HOURS IN WATER 62 TO 64 DEGREEES F *6040*."
R.ENVIRON.RL = "5450,5664,6040,6051,7667,9784,10161,48645871"

C.ENVIRON.RL = "THE OPTIMUM FLOW RATE FOR LARVAE IS FROM 0.3 TO 1.0 MLS *9784*. MUCH OF THE INFORMATION ON LARVAE IS GROUPED WITH THE INFORMATION ON JUVENILES *9685*. IN A NORTH CAROLINA LAB STUDY, FRY FROM EGGS INCUBATED AND HATCHED IN WATER AT 70 DEGREES F SHOWED NO MORTALITY. IN A 76 HOUR PERIOD AFTER HATCHING THE PERCENT OF NORMAL FRY DECREASED WITH INCREASED WATER TEMPERATURES, AND AT 74 TO 80 DEGREES F, NO FRY SURVIVED *5664*. IN A CALIFORNIA LAB STUDY, 97% OF THE LARVAE WERE ALIVE AFTER 72 HOURS IN WATER 62 TO 64 DEGREES F *6040*. FROM 0 TO 10% SALINITY IS OPTIMAL FOR THE SURVIVAL OF LARVAE *5450*."

R.ENVIRON.FJ = "4903,5973,6104,6122,6172,6325,7667,9784,49234966"

C.ENVIRON.FJ = "THE JUVENILES USUALLY OCCUPY SHALLOW ESTUARIES, RIVERS, OR BAYS WHERE THEY FEED ON SMALL CRUSTACEANS AND FISH *7667,8560,7074*. THEY CAN ALSO BE FOUND OVER GRAVELLY REACHES *7448*. IN AN ILLINOIS POND STUDY, THEY STOPPED FEEDING WHEN THE TEMPERATURE WAS LESS THAN 7 DEGREES C, AND FED WELL IN THE FALL AND WINTER WHEN TEMPERATURES WERE GREATER THAN 10 DEGREES C. IN THE SPRING, THEY BEGAN FEEDING WHEN THE TEMPERATURE WAS GREATER THAN 16 DEGREES C, AND DIDN'T FEED IN THE SUMMER IF THE TEMPERATURE WAS GREATER THAN 29 DEGREES C *5973*. IN AN ILLINOIS POND STUDY, THEY SURVIVED D.O. AS LOW AS 1.2 MG/LITER ON 2 OCCASIONS *5973*. IN ALABAMA CULTURE PONDS, THE CRITICAL D.O. LEVEL WAS 6 MG/LITER *6122*. IN A TENNESEE RESEVOIR, THEY SEEMED TO PREFER A SANDY SHORELINE HABITAT *6104*. IN A TENNESEE LAB STUDY, INCREASED WATER VELOCITY SIGNIFICANTLY REDUCED THE AREA RANGED BY JUVENILE STRIPED BASS *6172*."

R.ENVIRON.RJ = "4903,4923,4966,5973,6104,6122,6172,6325"

C.ENVIRON.RJ = "IN AN ILLINOIS POND STUDY, THEY SURVIVED D.O. AS LOW AS 1.2 MG/LITER ON 2 OCCASIONS *5973*. IN ALABAMA CULTURE PONDS, THE CRITICAL D.O. LEVEL WAS 6 MG/LITER *6122*. IN A TENNESEE RESEVOIR, THEY SEEMED TO PREFER SANDY SHORELINE HABITAT *6104*. IN A TENNESEE LAB STUDY, INCREASED WATER VELOCITY SIGNIFICANTLY DECREASED THE AREA RANGED BY JUVENILE STRIPED BASS *6172*"

R.ENVIRON.FA = "842,4910,5199,5676,6111,6595,7448,7667,7933,8560,8942,92051187"

C.ENVIRON.FA = "THEY ARE FOUND IN TAILWATERS *5199*. LAKES AND RESERVOIRS WITH ABUNDANT AQUATIC VEGETATION ARE UNSUITABLE *6111*. THEY MUST HAVE SOME SPECIES OF CLUPEID FISH PRESENT FOR FORAGE *6111*. IN LANDLOCK POPULATIONS STRIPED BASS USUALLY FEED ON SCHOOLS OF SHAD AT OR NEAR THE SURFACE. THE PEAK FEEDING IS USUALLY AROUND DAWN AND DUSK *7933,1187*. THERE ARE SEASONAL DIFFERENCES IN THE DIET, WITH 50% OF THE STOMACHS FULL IN THE SUMMER AND FALL AND 70% FULL IN THE WINTER AND SPRING *8942*."

R.ENVIRON.RA = "1187,4910,5199,5676,6111"

C.ENVIRON.RA = "THEY ARE FOUND IN TAILWATERS *5199*. LAKES AND RESERVOIRS WITH ABUNDANT AQUATIC VEGETATION ARE UNSUITABLE *6111*."

R.ENVIRON.BA = "1187,1641,5324,5654,5664,5665,6040,6041,6054,6289,50805764"

C.ENVIRON.BA = "THE ADULTS ARE ANADROMUS OR POTADROMOUS, SPAWNING UPSTREAM IN RIVERS, FREQUENTLY ASSOCIATED WITH THE FALL LINE *7448*. THE EGGS ARE BROADCAST IN THE CURRENT OVER A VARIETY OF SUBSTRATES *1641*. INSTEAD OF THE SPECIFIC RANGES LISTED, MISSOURI USED THE FOLLOWING TERMS: NO NOTICEABLE CURRENT, SLOW CURRENT, MODERATE CURRENT, AND/OR SWIFT CURRENT. IN NORTH CAROLINA, THEY SPAWN WHEN WATER TEMPERATURES REACH 55 TO 71 DEGREES F, WITH THE OPTIMAL TEMPERATURE BETWEEN 62 AND 67 DEGREES F *5665,5664*. IN OKLAHOMA, THEY BEGAN SPAWNING WHEN THE WATER WAS FROM 15.5 TO 18.5 DEGREES C, AND ENDED WHEN THE WATER WAS FROM 17 TO 26.5 DEGREES C *6289*. IN SOUTH CAROLINA, THE MINIMUM TEMPERATURE FOR SPAWNING WAS 58 DEGREES F *5654*. THEY SPAWN IN TRIBUTARIES TO THE RESERVOIR *5654,6289*."

LIFE.HIST = "PHYSICAL DESCRIPTION: THIS SPECIES IS ELONGATE, AND SILVERY WHITE WITH LONGITUDINAL LINES. THE DORSAL FINS ARE SEPARATE, AND THE SECOND ANAL SPINE IS SHORTER THAN THE THIRD. THE BACK OF THE TONGUE HAS TWO PATCHES OF TEETH. THE ADULT SIZE IS FROM 450 TO 2000 MM TL *9685*. |REPRODUCTION: THE SPAWNING SEASON IS FROM FEBRUARY TO JULY DEPENDING ON THE LATITUDE *6595,1641*. THE EGGS HATCH IN 48 HOURS AT 17 TO 21 DEGREES C *1641*. FECUNDITY ESTIMATES VARY FROM 10000 TO 40507500 WITH AN AVERAGE OF ABOUT 700000 *1641*. THEY SPAWN ONCE A YEAR WITH SPAWNING COMPLETED WITHIN A FEW HOURS *7667,1641*. THE AGE AT MATURITY VARIES, WITH THE MALES PRIMARILY MATURE AT 2 YEARS AND THE FEMALES DURING THEIR FOURTH OR FIFTH YEAR *7667*. SPAWNING IS USUALLY NEAR THE SURFACE WITH ONE FEMALE AND UP TO 50 MALES *7667*. MOST STRIPERS OVER 11 YEARS OF AGE ARE FEMALES, AND A 29 TO 31 YEAR OLD STRIPED BASS WAS CAUGHT IN RHODE ISLAND *7667*. FEMALES REACH MATURITY AT TOTAL LENGTHS OF FROM 432 TO 457 MM, AND MALES ARE MATURE AT 174 TO 254 MM TOTAL LENGTH. THE LARVAL STAGE LASTS 35 TO 50 DAYS, AND THE LARVAE BEGIN ACTIVE FEEDING AT 8 DAYS. THE JUVENILE STAGE LASTS FROM 35 TO 50 DAYS. YOUNG FEMALES PRODUCE BETWEEN 14,000 AND 65,000 EGGS, WHILE OLDER FEMALES MAY PRODUCE UP TO 5,000,000 EGGS *2545*. SPAWNING ACTIVITY MAY SLOW FROM 1 TO 3 PEAKS. THESE PEAKS ARE APPARENTLY ASSOCIATED WITH INCREASES IN WATER TEMPERATURE *2545*. THE EGGS ARE SPHERICAL, SEMI- BUOYANT, NONADHESIVE, AND APPROXIMATELY 1.3 MM IN DIAMETER AT FERTILIZATION AT 22 DEGREES C OR ABOUT 80 HOURS AFTER FERTILIZATION AT 11 DEGREES C. THE LARVAL STAGE IS DIVIDED INTO 3 PHASES, YOLK SAC (3 TO 9 DAYS AT 5 TO 8 MM TL), FINFOLD (METAMORPHOSING STAGE 11 DAYS AT 12 MM TL), AND POST FIN-FOLD (20 TO 30 DAYS AT 20 MM TL) *2545*. THE FACTORS INFLUENCING REPRODUCTION AND SURVIVAL OF EGGS INCLUDE: (1) WATER LEVEL FLUCTUATIONS, (2) WIND AND WAVE ACTION, (3) WATER QUALITY, (4) AQUATIC AND TERRESTRIAL COVER, (5) AIR AND WATER TEMPERATURE, (6) INVERTEBRATE AND FISH PREDATION AND (7) HUMAN ACTIVITY *1272*. DURING SPAWNING, 1 FEMALE IS USUALLY SURROUNDED BY SEVERAL MALES *1187,5324*. INCREASED WATER TEMPERATURE RESULTS IN A DECREASED INCUBATION PERIOD. A SOUTH CAROLINA STUDY, FOUND THE SMALLEST MATURE MALE TO BE 1 YEAR OLD ALTHOUGH MOST WERE MATURE AT 2 YEARS. ABOUT 23% OF THE FEMALES WERE MAT. AT 4 YEARS, 65% AT 5, AND 85% AT 6 YEARS *5654*. |BEHAVIOR: THIS IS A NON-TERRITORIAL MIGRATORY SPECIES *7667*. IN THE ATLANTIC, A SEASONAL MIGRATION OCCURS ALONG THE COAST WITH SPAWNING MIGRATIONS INTO FRESHWATER DURING THE SPRING *7667,1641*. IT IS NOT A STEADY FEEDER AND MEMBERS OF A SCHOOL NORMALLY FEED AT ABOUT THE SAME TIME. PEAK FEEDING TIMES ARE DAWN AND DUSK. SCHOOLING SPECIES ARE USUALLY THE DOMINANT PREY. THE YOUNG FEED NEAR THE BOTTOM ON CRUSTACEANS AND INVERTEBRATES *7667,8560,1641*. THEIR DEVELOPMENT IS RAPID, AND THE EGGS HATCH IN 48 HOURS AT 17 TO 21 DEGREES C *1641*. IN SOUTH CAROLINA, THEY SPAWNED IN THE DAYTIME AND AT NIGHT, AND 1 POPULATION SHOWED A SLIGHT PREFERENCE FOR SPAWNING IN THE DAYTIME *5392*. IN AN ILLINOIS LAB STUDY, FRY 9 TO 19 DAYS OLD REMAINED ACTIVE AND CONTINUED TO FEED AT NIGHT *5409*. FINGERLINGS FED AT A HIGH RATE IN AN ALABAMA CULTURE POND *6122*. IN A TENNESEE RESEVOIR, THE RELATIVE MORTALITY INCREASED WITH INCREASED STOCKING RATES *6104*. DISPERSAL FROM STOCKING SITES WAS RAPID *6104*. THIS SPECIES WILL SCHOOL AS ADULTS *1187,6172*, HOWEVER, JUVENILES EXHIBIT ONLY WEAKLY POLARIZED SCHOOLING BEHAVIOR *6172*. IN VIRGINA CULTURE PONDS, SCHOOLING OF FINGERLINGS WAS NOTED *5253*. THEY WILL HYBRIDIZE WITH WHITE BASS *5518*, AND THE SURVIVAL OF HYBRIDS IN A TENNESEE RESEVOIR WAS HIGH *5518*. ||LIMITING FACTORS: THE ADULTS HAVE FEW IF ANY PREDATORS IN INLAND POPULATIONS. THE YOUNG ARE VULNERABLE TO PREDATION BY THE ADULTS AND OTHER PISCIVORUS SPECIES *9685,7667*. THE AVAILABILITY OF FORAGE SPECIES MAY LIMIT THE POPULATION SIZE. THERE ARE NO NATURALLY REPRODUCING POPULATIONS IN ILLINOIS *9685*. |POPULATION PARAMETERS: THE SEX RATIO VARIES WITH LOCALITY, ALTHOUGH 90% OF THE INDIVIDUALS TAKEN IN COASTAL WATERS ARE FEMALES *7667,7933*. THE RATIO ON THE SPAWNING GROUNDS ARE AGE SPECIFIC WITH MALES DOMINATING THE YOUNGER AGE CLASSES *7667*. THEY LIVE ABOUT 12 YEARS, WITH YEAR CLASSES 3 TO 6 DOMINANT*7667*. THE GROWTH OF THIS SPECIES IS INVERSELY RELATED TO THE POPULATION DENSITY, AND CURVILINEARLY RELATED TO THE FORAGE CROP. THEY ARE FOOD DEPENDENT AT LOW FOOD AVAILABILITY, AND FOOD INDEPENDENT AT HIGH FOOD AVAILABILITY. THE ELEMENTS USED TO MODEL A BASS POPULATION IN A RESERVOIR INCLUDE: (1) A MINIMUM OF 25 POUNDS PER ACRE OF PREDATOR (BASS), (2) A MINIMUM OF 75 POUNDS PER ACRE OF PLANKTON FEEDERS (I.E., SHAD), (3) A MINIMUM OF 100 POUNDS PER ACRE OF BOTTOM FEEDERS (I.E., CATFISH). THE PRODUCTION OF THESE THREE FACTORS ARE CONTROLLED BY THE FERTILITY OF THE WATER, CLIMATE, WATER LEVEL FLUCTUATIONS, THE SHAPE OF BASIN AND SUBSTRATE COMPOSITION *1292*. THE BIOLOGICAL FACTORS WHICH INFLUENCE EARLY LIFE STAGES INCLUDE: (1) SIZE OF THE SPAWNING POPULATION, (2) PREDATION AND CANNIBALISM, (3) DISEASE AND FUNGI (IMPORTANT IN HATCHERIES, NOT IMPORTANT IN WILD POPULATIONS) AND (4) STARVATION (IMPORTANT IN HATCHERIES, NOT EVIDENT IN WILD POPULATIONS) *1155*. FACTORS USED TO ESTIMATE THE STANDING CROP OF BASS INCLUDE: (1) THE WATER DEPTH AND AREA OF WATERSHED AND AREA UNDERWATER, (2) THE FERTILITY OF WATER AND WATERSHED, (3) THE SPECIES COMPOSITION OF THE SYSTEM, (4) A

POPULATION ESTIMATE, (5) THE AVERAGE SEASONAL WATER TEMPERATURE AND (6) THE LENGTH OF THE GROWING SEASON *2643*. IN SOUTH CAROLINA, THE MALE:FEMALE SEX RATIO WAS 40:60 *5654*. THE ADULTS ARE COMMONLY FROM 5 TO 20 POUNDS, ALTHOUGH GROWTH IS QUITE VARIABLE, AND FEMALES GROW MORE RAPIDLY THAN THE MALES. A 7 YEAR OLD FISH FROM TAUM SAUK RESEVOIR WAS 28 INCHES AND 13.25 POUNDS. IN LAKE OF THE OZARKS, FISH STOCKED IN 1970 WEIGHED 3.75 TO 5.5 POUNDS AND WERE FROM 18 TO 22 LONG IN 1973 *1187*. IN SOUTH CAROLINA, THE GREATEST GROWTH IN LENGTH OCCURRED DURING THE 1ST 3 YEARS OF LIFE *5654*. IN A TENNESEE LAB STUDY, FLUCTUATING TEMPERATURES ENHANCED GROWTH RATE *5039*. |AQUATIC|TERRESTRIAL ASSOCIATIONS: PREDATORS OF THE LARVAE INCLUDE AQUATIC INSECTS, BLUEGILL, GREEN SUNFISH, CRAPPIE, FLATHEAD MINNOW, AND MOSQUITOFISH *795*. THE STRIPED BASS, MORONE SAXATILIS, IS A MARINE AND ESTUARINE SPECIES NATIVE TO THE ATLANTIC COASTAL REGION FROM CANADA TO FLORIDA, AND THE GULF OF MEXICO COAST FROM FLORIDA TO LOUISIANA (02:576). IT IS ANADROMOUS (EXCEPT FOR LANDLOCKED INTRODUCED POPULATIONS), TYPICALLY SPAWNING IN RIVERS JUST AHEAD OF TIDAL INFLUENCE (02:576). IN PENNSYLVANIA, THE STRIPED BASS IS NATIVE TO THE DELAWARE RIVER, ESTUARY, AND THE TIDAL TRIBUTARIES, AND THE SUSQUEHANNA RIVER (05:24;06:10). HOWEVER, IT IS DOUBTFUL THAT SPAWNING OCCURRED IN THE SUSQUEHANNA (00). STRIPED BASS HAVE BEEN INTRODUCED TO OTHER LAKES AND RIVERS IN THE STATE (07)."
R.LIFE.HIST = "795,1187,1310,1641,2545,5199,6040,6104,7667,7933,8285,8560,9685,61725752"
MANAGEMENT = "ADVERSE-MAINTAINING DRY STREAM BEDS AND|OR GULLIES,ADVERSE-Draining wetlands, marshes, ponds, lakes,ADVERSE-CHANNELIZATION,ADVERSE-CONSTRUCTION OF NAVIGATIONAL IMPROVEMENTS (DAMS, LOCKS, ETC.),ADVERSE-DREDGING,ADVERSE-Controlling undesirable vertebrate species,BENEFICIAL-RESTRICTING|REGULATING HUMAN DISTURBANCE OF POPULATIONS,BENEFICIAL-LOCATING CULVERT OUTLETS TO BE BELOW STREAMBED LEVELS,BENEFICIAL-DEVELOPING|MAINTAINING SUITABLE SALINITY,BENEFICIAL-DEVELOPING|MAINTAINING SUITABLE PH,BENEFICIAL-Developing|maintaining|protecting wetlands,BENEFICIAL-Controlling sedimentation,BENEFICIAL-Controlling pollution [thermal, chemical, physical],-"
R.MGT.B = "1187,5518,5752,5893,5933,5969,6111,6127,6323,7667,9685,49105376"
R.MGT.A = "7667,9685"
R.MGT.E = "9685"
C.MGT = "THIS SPECIES IS STOCKED IN MISSOURI AS A CONTRIBUTION TO THE FISHERY AND TO UTILIZE GIZZARD SHAD*1187*. THEY ARE POPULAR FOR STOCKING SINCE THEY GROW RAPIDLY, ATTAIN A LARGE SIZE, AND UTILIZE ABUNDANT SHAD *6104*. IN THE SOUTHEASTERN U.S., STOCKING FINGERLINGS IS GENERALLY THE MOST SATISFACTORY METHOD *6111*. THEY MUST HAVE SUITABLE SPAWNING AREAS IF THE POPULATION IS TO BE SELF-SUSTAINING *5752*. IN A TEXAS RESEVOIR, WHITE BASS AND STRIPED BASS HYBRIDS GREW RAPIDLY AND HAD HIGH SURVIVAL. THE RECREATIONAL BENEFITS OF STOCKING HYBRIDS SURPASSED THE COSTS *5518*. WHITE BASS AND STRIPED BASS HYBRIDS HAD FASTER EARLY GROWTH AND HIGHER SURVIVAL THAN STRIPED BASS *5969*. AN OKLAHOMA POND CULTURE RECOMMENDED 1) PROVIDE AN ABUNDANCE OF COPEPODS EARLY IN THE SEASON, AND CLADOCERANS AND INSECT LARVAE LATE IN SEASON, 2) DELAY ADDING FORAGE FISH UNTIL THE STRIPED BASS ARE 4 TO 5 INCHES LONG AND 3) SOFT-RAYED FISH OF FUSIFORM BODY SHAPE ARE THE BEST FORAGE *5202*. IN ALABAMA, STRIPED BASS CULTURE IN CONTINUOUSLY AERATED PONDS PRODUCED 2.4 TIMES THE NUMBER OF FINGERLINGS PRODUCED BY CONVENTIONAL METHODS *5527*. IN OKLAHOMA, PLANKTON WAS USED AS FOOD IN THE HATCHERY PRIOR TO RELEASE INTO CULTURE PONDS *5640*. IN ALABAMA, THE BEST RESPONSE TO FEEDING WAS OBTAINED WHEN THE SURFACE WATER TEMPERATURE WAS GREATER THAN 10 DEGREES C. THE AVERAGE SURVIVAL, MEAN PRODUCTION, AND FOOD CONVERSION OF FINGERLINGS WERE BEST AT THE FOLLOWING FEEDING RATES: 10% OF BODY WEIGHT JULY 7TH TO THE 31ST, 7% OF BODY WEIGHT FROM AUGUST 1ST THROUGH THE 31ST, 6% OF BODY WEIGHT FROM SEPTEMBER 1ST THROUGH THE 30TH, AND 5% BODY WEIGHT FROM OCTOBER 1ST TO THE 31ST *6122*. IN OKLAHOMA, STRIPED BASS PREYED ON TROUT AFTER TROUT STOCKING *5065*. AN ILLINOIS STUDY CONCLUDED THAT STRIPED BASS ARE WELL-SUITED TO BE A POND REARED FOOD FISH *5973*. ONE STUDY RECOMMENDED MANAGING ONLY THE DOMINANT YEAR CLASSES TO OPTIMIZE YIELDS *5033*."
ALL.REFS =
10864* ROBINS, C.R., BAILEY, R.M., BOND, C.E., BROOKER, J.R., LACHNER, E.A., LEA, R.N. 1980. A LIST OF COMMON AND SCIENTIFIC NAMES OF FISHES FROM THE UNITED STATES AND CANADA.4TH EDITION.SPECIAL PUBLICATION NO.12. SPECIAL PUBLICATION NO.12. (12). THE AMERICAN FISHERIES SOCIETY. BETHESDA,MD:174.

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