PRODUCTION NOTE

University of Illinois at Urbana-Champaign Library
Illinois River Natural Resources Bibliography

Final Report
to
U.S. Army Corps of Engineers
Rock Island District

Prepared by:

Mark A. Pegg
and
Stephen P. Havera

30 September 2001
Introduction

The Illinois River was formed by the union of the Des Plaines and Kankakee rivers near Chicago in northeastern Illinois and traverses about 440 km to Grafton, Illinois, near St. Louis, Missouri, where it empties into the Mississippi River. This geographical location makes the Illinois River one of the more important river systems in North America for human use and development. Likewise, the Illinois River has historically been one of the most biologically productive floodplain river systems in North America and for this reason has been exposed to human activity for thousands of years. By the late 19th and early 20th centuries, recreational and commercial harvest of waterfowl, fish and mussels were among the highest recorded for freshwater systems.

Concurrent with many other systems, an increased capacity to manipulate the river and its floodplain through pollution, water diversion, levees and drainage districts, dams, large-scale agriculture, and other management practices began to place a tremendous burden on the river's ecosystem by the early 20th century. One of the first major alterations to the Illinois River system was the creation of the Illinois Waterway to alleviate chronic water quality problems in the immediate Chicago area and to facilitate navigation. The Waterway was initiated in 1900 by building the Chicago Sanitary and Ship Canal and reversing the flows from the Chicago and Calumet rivers into Lake Michigan southward into the Illinois River. Some biological communities were adversely affected by increased water levels from the water diverted out of Lake Michigan and the accompanying high levels of raw sewage and industrial wastes that were flowing into the Illinois River from the heavily populated Chicago area after formation of the waterway. By the 1920s, effects of the diverted pollution were observed along nearly two-thirds of the river. Fortunately, water treatment and improved water quality regulations have ameliorated these conditions.

There have been other significant alterations to the Illinois River since the diversion of Lake Michigan water including construction of drainage and levee districts for development of agriculture in the productive floodplain on both the mainstem river and its tributaries and construction of locks and dams for navigation. These manipulations, along with increased row crop acreage and fall tillage, have influenced the biological communities within the Illinois River basin through unnatural hydrologic conditions, point and non-point source
pollution, high rates of sedimentation, and subsequent losses of aquatic and terrestrial habitats.

Human influences have ultimately created a need for major restoration efforts and wise land use policies and practices in the Illinois River basin. As part of the process, a synthesis and collation of existing information on the biological communities throughout the river system is essential to coalesce knowledge from previous important undertakings, to help identify areas that should be specifically targeted for restoration and to establish past and present conditions for assessment of future restoration efforts.

**Scope of Work**

The Illinois River Natural Resources Bibliography is a compilation of over 100 years of research by Illinois Natural History Survey staff as well as other investigators. It contains 559 references pertinent to the biology of the Illinois River and its watershed. Main topics covered include ecology, biology, chemistry, hydrology, and history of the Illinois River system. However, some citations dealing specifically with geology, policy, and economics are also included. Most references are housed at the Illinois Natural History Survey’s main library in Champaign and the library of the Survey’s Forbes Biological Station near Havana, Illinois.

This bibliography is divided into annotated and non-annotated sections. The annotated component provides a brief synopsis of the contributions of each reference to the information pertaining to the Illinois River basin. The non-annotated section contains an extended list of other relevant publications and reports dealing specifically with the Illinois River basin. A list of selected long-term data sets and maps of the Illinois River is also provided.
Acknowledgments

Several staff members of the Illinois Natural History Survey assisted with the various aspects of compiling this report. Katie Roat, Derek Struebing, and Paul White helped summarize the annotated and non-annotated components. Jaylene Olson, Katie Roat, and Cammy Smith were instrumental throughout the project in its design, organization, execution and report preparation. We thank them for all of their efforts and extraordinary cooperation.
Annotated Bibliography


The author studied zebra mussel population dynamics in the Illinois River in an attempt to predict future larval zebra mussel distributions. Specifically, the author investigated the viability of existing populations to determine if they are self-sustaining. The results of this study were inconclusive regarding self-sustainability of zebra mussels in the Illinois River. A detailed life history is included.


This paper outlines the importance of the Illinois River fishery to fish harvest elsewhere in the United States in the late 1800s and early 1900s. By 1908, total catch along the Illinois River totaled nearly 24,000,000 pounds comprising over 10 percent of the freshwater fish harvested in the United States.


Gizzards from 17 species of ducks were collected in 1938, 1939, and 1940 from 21 sites along the Illinois River and 11 sites along the Mississippi River. Laboratory analyses were made of the plant, animal, and inorganic contents of the gizzards of each duck species. Nineteen plant species and some animal species most commonly used by ducks throughout Illinois are discussed.

The author conducted a survey for fingernail clams (Musculium transversum) using Ekman grabs, at 20 sites along the Illinois River (river mile 18.9-277.0). Major findings include the observation that M. Transversum is only found in the lower 107 miles of the river and that their densities are greatly reduced compared to historical information. In an attempt to identify a possible cause of this decline, the author also conducted experiments on several water quality parameters (potassium and hardness). Water samples taken from the Illinois River were not in the acutely lethal range for M. transversum.


The report summarizes a study on lead poisoning in waterfowl between 1977-1988 by determining the incidence of spent shot in soil and sediment, by examining gizzards for ingested shot, by analyzing blood for concentrations of lead and protoporphyrin, and livers for concentrations of lead. The study showed that the use of steel shot in some zones in the Mississippi Flyway is helping decrease the number of waterfowl deaths caused by lead poisoning.


Gizzards of 74,365 waterfowl harvested in 13 states in the Mississippi Flyway during the hunting seasons of 1977-1979 were collected. These years were the first in which nontoxic (steel) shot regulations were implemented in this flyway. Ingestion of lead shot by mallards was reduced an estimated 34.1 percent in the upper-latitude states of the flyway, 29.4 percent in the mid-latitude states, and 3.2 percent in the lower-latitude states during the 3 hunting seasons that were monitored. The severity of shot ingestion and the potential for lead poisoning have not changed significantly since the period of investigation of 1938-1954.

The study summarizes the extent to which ingested nontoxic shotgun pellets replaced toxic pellets in ducks harvested in the Mississippi Flyway during the 1996-1997 hunting seasons. Nontoxic shot reduced mortality in mallards by 64 percent. Ingestion of >2 toxic pellets declined by as much as 78 percent. Out of 1.4 million ducks in the 1997 fall continental flight, 90 million ducks were spared from fatal lead poisoning. An estimated 99 percent of all ducks harvested were by hunters using nontoxic pellets.


The author compared fish population dynamics from hoopnet collections along the Illinois River over three time periods (1930-1940s, 1950-1960s, and 1970). Four habitats were sampled including main channel border, side channel border, backwater lake, and tributary. The author noted a shift in species composition with the most marked change over the 1950-1960s sample period.


Various types of pollution and the mechanisms by which they effect the fauna of various North American rivers are reported. Gastropod populations of the Genesee River of New York and mussel beds of the Big Vermilion River, Illinois, are discussed, with particular reference to effects of pollution on distribution.

Waterfowl gizzards were processed from throughout the Illinois River valley to evaluate food habits. Recommendations for managing moist-soil plants in bottomland lakes are suggested.


The paper includes a description of the physical features and hydrology of the Illinois River and discusses aquatic plants in the Illinois River valley in the context of environmental factors affecting their distribution and abundance. It lists the best duck food plants as well as undesirable species. Habitat manipulations are mentioned.


Conducted in the early 1940s, this study compares the values of leveed and drained bottomland to natural bottomland. The economics of harvesting furbearers, commercial fishing, and leasing of duck blinds for hunting in these bottomland areas is discussed. The impact of drainage and levee districts on natural resources is evaluated. The author recommends water and flood storage in bottomlands rather than building larger levees.


This paper provides a description of the waterfowl management challenges in the Mississippi Flyway during the late 1940s. The destruction of northern breeding grounds by agricultural interests and degradation of wintering grounds by the Army Corps of Engineers are reported. A brief discussion concerning season lengths and bag limits to control waterfowl harvest is included.

This study was conducted during the winter months of the early 1940s on food plants for muskrats found in bottomland lakes of the Illinois River. The study was conducted by comparing the proportion of plant food material found in feeding houses in mid-winter with the late-summer availability of plants within the feeding radius of the houses. The study found that even though there was individual variation, it was evident that muskrats selected certain plants and certain parts of plants for food consumption.


An evaluation of the importance of waterfowl refuges in Illinois found that waterfowl remain in the area longer because of the abundance of food and rest available in these areas. Refuges along migration routes also provide more hunting opportunities to sportsmen by building up local concentrations from which mallards and some other species fan out to feed over a radius of about 25 miles.


Lead poisoning in waterfowl populations was evaluated by: (1) the incidence and magnitude of waterfowl die-offs resulting from lead poisoning in all major flyways, (2) the incidence of lead shot ingested by waterfowl, and (3) waterfowl mortality resulting from the ingestion of various quantities of lead shot.


This classic encyclopedia of North American waterfowl includes 55 species accounts with chapters on classification, molts and plumages, migration,


This report gives background on waterfowl research starting with Fredrick Lincoln banding ducks in 1922 near Browning and continues with a chronology of investigations along the Illinois River. It concludes that because much wildlife habitat has been removed due to agricultural, transportation, and electrical power developments, new management techniques must be considered.


A study of Illinois River valley plants and their value to ducks as a food resource. The plants were collected from four bottomland lakes during the late 1930s to derive an index of the different varieties of plants. Gizzards were examined to evaluate which plants were most valuable to ducks as a food source. Eleven common food plants are ranked by their importance.


This bulletin presents data and discussion about the preferred foods of waterfowl in the Illinois River valley. The occurrence of plants and corresponding consumption by ducks were both used to arrive at a food index value for each plant species. A list of 25 plant species in descending order of index values is included.

It was found that muskrat populations are affected more by changing water levels than by types of marsh vegetation in the Illinois River valley. This study recognized cattail and river bulrush as the two most important plants for muskrats. It concluded that many factors including vegetation, housing, and food were limited chiefly by seasonal changes in water levels.


In the early 1900s, man briefly enhanced the fish and waterfowl resources of the Illinois Valley by increasing the surface area of its bottomland lakes with diversion of water from Lake Michigan. Then by removing about half of the floodplain from inundation by the river with the establishment of drainage and levee districts between 1909 and 1922, flood heights and deposition of sediments were increased on the unleved lakes and floodplain. The authors conclude that the only alternative to a continued loss of bottomland lakes is to convert some drainage and levee districts to flood storage and conservation and recreational use.


From depressed numbers at the turn of the century, and widespread concern about the species' potential extinction, the wood duck is the most common breeding waterfowl in the eastern United States. This book encompasses a 50-year span of studies on the wood duck covering topics such as distribution, habitat, migration, courtship, breeding, nesting, competition, food habits, growth, disease, and population management.

This report summarizes a study conducted on natural cavities used by wood ducks for nesting compared with man-made nesting structures. The study shows that man-made nesting houses have a much better success rate when accepted by female wood ducks. On Quiver Creek near the Illinois River, the use of predator-proof nesting structures increased breeding pairs from 15 to over 90 pairs. Cylindrical metal houses are more predator proof than wood houses, but the metal houses are not easily accepted. Management implications and recommendations for man-made nesting structures are given.


Muskrat population studies on Douglas, Chautauqua, and Rice lakes are discussed in this paper with special reference to water levels. Changes in lodge construction habits, activity, feeding, intraspecific strife, and mortality due to high or low water levels are covered.


The report includes a description of the geologic history, hydrology, and ecology of Illinois River valley and associated bottomland lakes. It focuses on the accelerated destruction of the lakes due to sedimentation. Negative effects of increased sedimentation, water levels, and water turbidity on vegetation and waterfowl are discussed.


The economic value of the fish and wildlife resources of bottomland lakes in Illinois is estimated and discussed. Public fish and wildlife values were appraised by determining the cost of hunting and
fishing for the game species and the monetary value of commercial species. Private values were calculated considering the value of hunting leases, boat rentals, and commercial fishing. An economic comparison of public and private is presented.


Waterfowl are dependent on wetlands for their life requirements. As wetlands have been drained or degraded, duck populations have declined. On prairie breeding grounds the importance of wetland losses to the status of waterfowl is well documented, and must be considered as a factor of the overall decline in waterfowl populations. Future acquisitions of privately-owned wetlands in the flyways must be accomplished to save remaining wetlands.


Twenty-four individuals from nine species were collected during a survey of a proposed bridge site on the Mississippi River near Hannibal, Missouri. One recently dead specimen of the federally endangered Lampsis higginsi and five specimens of Ellipsarea lineolata, a species proposed as threatened in Illinois, were collected at the study site.


Discusses the concepts and goals of the Long-term Ecological Research (LTER) project along the Illinois River. Specific research components included work in 1) succession and perturbation, 2) water and sediment fluxes, 3) biotic system structure, and 4) ecosystem function. Summaries of results from these four components are discussed.


In 1962 at a heronry located at Pekin Lake in Tazewell County, 820 nests were observed but by 1974 there were none. Destruction was attributed to illegal logging, power lines being constructed, and other human activities.


Toxicities of surface and deep sediments were assessed at five locations on the Illinois Waterway by bioassays from fingernail clams. Toxicities for these sediments were measured by assessing behavioral shifts of the clams in the form of lateral ciliary beating rates, particle transport rates, and percent cilia beating based on exposure to sediments from each site x sediment type combination. Sediments from Starved Rock Lock and Dam and above caused significant changes in behavior, with the greatest effect occurring in sediments from Brandon Road Lock and Dam on the Des Plaines River.


A mussel community in the Kankakee River, Illinois, was surveyed utilizing quadrant sampling and SCUBA. Sampling locations were recorded using a distance-measuring device and computerized into a map format.
Mussel densities were plotted on the computer map, resulting in an accurate mapping of the mussel "bed".


Fish, mussels, and benthic macroinvertebrates were sampled in the Kankakee River, Illinois, to determine effects of increased sedimentation, especially on species considered endangered or threatened. Increased sedimentation, depending on the magnitude of the increase, could damage or eradicate mussel populations, including any endangered or threatened species.


This report was part of the Great Lakes-Illinois River basin comprehensive study conducted by the U.S. Department of Health, Education, and Welfare. It is a summary of the decline of fish and wildlife populations along the Illinois. Much of this decline has been attributed to degraded water quality and habitat conditions. Included are data showing historical trends and discussion of future conditions.


This paper is a discussion of the history of commercial musselsing on the Illinois River including locations of principal mussel beds, appraisals of commercial shells, collecting techniques, and economic information. At the time of this report pollution was considered to have little effect on species composition and abundance. Distribution and relative abundance (quantity and quality) of mussels in the Illinois River and its tributaries was reported.

Study of paddlefish feeding habitats and behaviors. Food items consisted largely of planktonic organisms. A summary of feeding behaviors is also included.


This report provides a literature review of physical, chemical, and biological information on the Illinois River through 1972. Physical characteristics described include turbidity, sedimentation, and water temperature. Major chemical characteristics included dissolved oxygen, pH, alkalinity, nitrogen, phosphorus, chlorophyll, and total dissolved solids. Biological information was presented for bacteria, plankton, benthic macroinvertebrates, fish, waterfowl, and vegetation.


A list of mussel species collected from three river systems, Embarrass (28 species), Little Wabash (21 species), and Kaskaskia of central Illinois (35 species), from 1951 to 1953.


A descriptive list of different crustacea found in 1876 and how much they differ by kingdom. The economic value of the fisheries of the Illinois River valley and its importance in the future is discussed.

This was an important address to the American Fisheries Society in 1911. Biological damage to the Illinois River by Chicago sewage is discussed. Descriptions of the river’s appearance illustrate the severity of the problem at that time. Information on the historical changes to the river and commercial fishing data, along with fish behavior and life-history observations are discussed.


The report examines changes in the biological environment of the Illinois River caused by the opening of the drainage canal of the Sanitary District of Chicago in January, 1900. The increase of sewage and water volume into the Illinois River are noted as the primary factors of changes including an increase in the river average depth and flow rate, a greater expanse and depth of bottomland lakes, increased sewage load, lower average water temperature, and greater production of plant and animal life. Fish production is discussed with an emphasis on the introduction and spread of the European carp. The effects of drainage and levee districts on the Illinois River are noted.


A summary of the fishes of Illinois in the early 1900s. Includes a scientific description of fish species, their distribution and relation to their environment, topography and hydrology of Illinois, a summary of their habits, and the function and relative importance of the different species in the general system of aquatic life. More than 200,000 specimens of 150 species were collected and preserved. This book is accompanied by a separately bound atlas of maps showing the distribution of Illinois fishes.

After several years of investigation on the plankton of the Illinois River and its floodplain lakes, this comparative summary study took three directions: the first year was given mainly to a study of the plankton of the river and of the principal floodplain lakes using the same methods and in the same area as those made from 1894-1899; the second year concentrated on the chemical determinations of the gases in the river and the bottom sediments of the upper river; and in the third year, similar chemical and biological determinations were made with attention on the fishes, mussels, and other plant and animal life of the river.


Commercial harvest of mussels in Illinois are summarized for the years 1971-1981. Harvest during this period peaked in 1977 when 932 tons of cooked-out shells were sold for nearly $257,000.


In 1985, mussel shell buyers purchased a total of 1,963.44 tons of shells from Illinois musselers, for which they received $978,614. Prices paid ranged from $150 to $990 per ton. The Mississippi River harvest was composed of five species, *Megalonais gigantea* (60.5%), *Amblema plicata* (37.7%), *Quadrula quadrula* (1.4%), *Quadrula pustulosa* (0.4%) and *Fusconaia flava* (0.01%).


This paper begins with a description of the study area near Havana and the plant associations located there. General statements concerning the local bird fauna are presented. Each plant association and its attendant bird community are discussed. These associations are
bunchgrass prairie, meadows, prairie swamps, aquatic, sand strand, mud strand, thicket, bottomland woods, upland forest, and mixed forest. Contains a good description of forested bottomland areas.


An explanation of collection methods and preservation of entomological samples taken from the Illinois River and backwater areas near Havana. List of insect species is provided.


Historical overview of biological production in the Illinois River Valley, the development of waterfowl hunting traditions, and anthropogenic changes in the 1990s. Historic recommendations on preserving and restoring wetlands in the valley are discussed.


A 672-page comprehensive source on the biology, management, and status of waterfowl. This book captures the strong traditions of waterfowling in the heart of the Mississippi Flyway. Illustrations, tables, color photos, and original artwork in the this collection document more than a century of waterfowl investigations. It is supplemented by an abbreviated field guide to the waterfowl species of Illinois summarizing their identification, life history, food and habitats, complemented with full color photographs and illustrations.

An account of the ecological integrity of the Illinois River, historically one of the most productive riverine ecosystems in North America, and its degradation by accelerated amounts of sediment resulting primarily from intensive agricultural land-use practices. The current biological value of the river system could disappear in less than 100 years.


This study conducted in the late 1970s, examined the effects of increased diversion of Lake Michigan water on aquatic and terrestrial ecosystems in the Illinois River Valley including physical changes of the river valley, water quality, surface area of bottomland lakes, vegetation, moist-soil plants, fisheries, and wildlife.


The report summarizes a study conducted involving human disturbances on waterfowl. Concentrates on the decrease of diving ducks populations and the relationship of disturbances such as boating, fishing, hunting, and barges. The assumption is made that human disturbances will increase. Management recommendations to accommodate diving duck populations in the future are discussed.

This paper summarizes aerial inventories of bald eagles taken on the Illinois River and Mississippi River between 1957-1984. Five major regions are inventoried during these years and of these regions the central Mississippi River region supported the highest average number of eagles counted per weekly or biweekly census periods. The highest inventory of bald eagles occurred in January 1984 in the Illinois River and central Mississippi River regions. The inventories show that since 1957 the numbers counted during the winter waterfowl and eagle survey are increasing.


The report found that continental numbers of bald eagles have increased since eagles achieved legal protection and since the prohibition of certain pesticides that affected reproductive success of eagles. Wintering bald eagles are attracted to Illinois by the availability of food, primarily fish. The study found that a majority of the eagles in Illinois are in the Illinois River valley. The report concludes that intensified enforcement of laws protecting bald eagles, along with management of habitats identified as feeding, roosting, and major eagle use areas, and reduction of lead shot to eagles should result in an increase in the number of bald eagles that winter in Illinois.


The study investigated potential effects of increasing the diversion of Lake Michigan water at Chicago into the Illinois River on terrestrial habitats in the Peoria and La Grange pools. Three proposed diversion plans and nine habitat categories were identified and measured on the study areas. The effects of longer
durations of increased water levels on the various habitat categories are discussed. Mud flats and their associated moist-soil plant community are identified as the most affected by a change in water levels.


Several studies have addressed the detrimental effects of fishes on waterfowl food resources. Recently, concerns have been expressed about the effects of waterfowl management utilizing water control structures in floodplains on riverine fish populations. This study investigated the acreage of public and private land managed for waterfowl with water level control capabilities in the Illinois and Mississippi River floodplains. Researchers and managers must work together for the benefit of the resources and not give the image to the general public that there is a lack of cooperation among disciplines.


The authors assembled an inventory of species and abundance for the fish community of the upper Des Plaines River. Twenty-eight species were collected in 1985 with spotfin shiners and sand shiners being most numerically abundant, whereas, total biomass was dominated by river carpsuckers.


The report describes three species of rotifera collected in the Illinois River during 1894 previously unknown to science. Ninety species of rotifera and eighty species of protozoa were collected and identified.

The publication summarizes a study conducted in 1894-1896 on the protozoa and rotifera of the Illinois River and surrounding lakes near Havana. Methods of capture and study, geographical distribution, food relations, classification, and local distribution in the Illinois River valley are discussed. A list of protozoa and rotifera discovered during the study is presented.


Water budgets for four constructed wetlands near the Des Plaines River are discussed. Inputs such as pumped inflow, precipitation, flood flows, evapotranspiration and ground water were monitored. The resulting data were then used for a hydrologic model to estimate the stress load on the wetlands. The authors concluded that a 2 percent wetland reserve would result in water quality enhancements.


Water quality fluctuations were evaluated in four constructed, experimental wetlands near the Des Plaines River in 1990 and 1991. Total suspended solids, volatile suspended solids, nitrate-nitrogen, and total phosphorus were measured at the inlet and outlet of each wetland. All variable values were lower at the outflow point with trap efficiencies ranging from 50 to 99%. The wetlands were subjected to different hydraulic loading rates, but the outflow water quality values were similar.

In a study using mallards, wood ducks, green-winged teals, gadwalls, lesser scaups, and ring-necked ducks, researchers found that the body weights and condition indices were less than a previous study conducted from 1938-1940. Reasons for this decline are discussed.


This comprehensive examination of the water quality of the Illinois River around 1922 includes a description of the river, the population of the watershed, and sources of pollution. Methods and laboratory procedures are extensively outlined.


This article discusses how man has altered floodplains for agriculture, navigation, urban development, and flood control. There are many challenges for land managers to integrate management methods for fish and wildlife because they are faced with competing groups that want more agriculture and better navigational rivers. The article focuses on not looking at site-specific management, but looks at the entire river floodplain when trying to make management decisions.


The Critical Trends Assessment Project (CTAP) is an ongoing process established to describe changes in ecological conditions in Illinois. Many natural resource agencies worked collaboratively to produce a 7 volume technical publication describing the environmental conditions in Illinois. This publication
(Volume 3) is the Illinois Natural History Survey's contribution to this project. Volume 3 is segregated into six ecosystem sections including prairies, forests, agricultural lands, wetlands, lakes and impoundments, and flowing waters. The text has an in-depth discussion of each ecosystem. The seventh section provides a resource analysis.


The Critical Trends Assessment Project (CTAP) is a compilation of information on environmental factors including air, water, and ecological resources, as well as information on waste management and sources of environmental stress. These data will be used to develop and monitor changes in ecological and environmental conditions throughout Illinois.


Deposition of sediment from flood waters of the Illinois River caused high turbidity in Chautauqua Lake. Lake bottom disturbance by fish, and/or water motion produced by wind caused resuspension of sediment particles. Wind velocity had little or no effect when vegetation or ice cover was present or in areas where water depth exceeded 5.8 feet. Important duck-food plants that were formerly abundant were adversely affected by sediment and fluctuating water levels. Changes also occurred in the species composition of fishes. High productivity of the lake was attributed to the shallowness of the lake during the growing season when most of the lake was within the euphotic zone.

This report gives a chronological overview of events that have occurred on the river and evaluates potential sites for conservation throughout the Illinois River valley.


A summary of studies conducted to identify conservation areas along the Illinois River that would potentially be beneficial for flood control. An historical view of previous projects on the river, history of floods, geology of the river, and need for recreational areas are discussed.


The flood pulse is defined as the driving force responsible for the existence, productivity, and interactions of the major biota in river-floodplain systems. The article explains how to use the aquatic/terrestrial transition zone to monitor the shifts in the littoral zone, which are important for nutrient recycling and productivity. Researchers are encouraged to look at the whole floodplain and backwater lakes through a flood pulse concept.

Mussels and fishes were surveyed at a proposed bridge replacement project site on the Kankakee River, Illinois, to determine species composition, distributions, and density. Mussels were collected by wading and hand picking. Four-hundred and eighty individuals representing eleven species were collected including no endangered or threatened species. Two species found, Cyclonaias tuberculata and Ligumia recta, were considered to be uncommon and on the decline.


Conducted on approximately 700 acres of wetland purchased by The Nature Conservancy in Brown County, Illinois, this study attempts to determine and compare biotic and abiotic pollution indicator levels generated from water sampling in a restored wetland. Sampling on 11 sites, it was found that many wetlands could potentially lower the pollution indicators, and the microbial population in wetlands may contribute to biogeochemical cycles.


Analyses of the hydrology of the upper Sangamon River indicate no change in flows comparing the early-twentieth century to the mid- to late-twentieth century. Significant development and change has occurred, but the authors conclude that enough floodplain exists to maintain a primitive flood pattern.

Conducted in 1974 on the lower Illinois River and upper Mississippi River, this report includes descriptions of vegetation types, interpretation of successional patterns, and prediction of the probable succession changes that will result from operation and maintenance activities.


The article explains why some methods used by previous researchers will not work on the Illinois River. Detailed methods of making nets for capturing plankton on the Illinois River and its backwaters are discussed.


A description of the geological and hydrographic features of the Illinois River including river length, drainage area, tributaries, elevations, alluvial deposits, connections with backwaters, dams, current, water volume discharge, flooding characteristics, high- and low-water periods, water temperatures, turbidity, water chemical composition, and associated vegetation are discussed. Plankton collections and measurements in the river channel and backwaters are the primary purpose of the study. The relation of environmental factors on plankton production and seasonal distribution charts of plankton at the collection stations are included.


This was part of a continuing study on the density of plankton in the Illinois River and surrounding bottomland lakes conducted in the early 1900s in the Havana area. It was found that the density of the
middle river channel had the same density of plankton as the bottomland lakes. It discusses the best times and conditions for plankton blooms, and points out that they are a vital part of the aquatic environment.


A discussion of the statistical data of the plankton of the Illinois River during 1894-1899 is presented. Plankton collections were made only in the river channel and facts pertaining to relative abundance, seasonal distribution, and periods of maximum occurrence are cited. Further discussion of environmental factors affecting plankton abundance such as water levels, seasonal pulses, floods, and water temperatures are included.


This article discusses the historical aspects of reversing the Chicago River and how this reversal helped to ease a potential public health crisis. The various construction projects and their impacts are summarized.


This summary of electrofishing surveys conducted from 1959-1995, concentrates on the differences of up-stream and down-stream fish. Findings indicate that there are fewer abnormalities of fish up-stream than in previous surveys, with the conclusion that water quality is improving. Populations of fishes are also noted.

Freshwater mussels of the Kankakee River were surveyed during 1976 and 1978. Twenty species were collected compared to 22 species in 1909. Although diversity declined and relative abundance was lower, fauna of the lower Kankakee River has not changed dramatically like it has in the nearby Des Plaines and Illinois rivers.


Seven hundred ninety samples from 28 food plants of Illinois waterfowl were evaluated in the 1940s. The study was conducted on 19 lakes with 3 lakes being stable, 7 semistable, and 9 with fluctuating water levels. Quantity and quality of plants were evaluated. The study concluded that plant competition greatly affected the amount of seeds produced.


This document provides a summary of the information available relating physical, chemical, and biological effects of navigation on the upper Mississippi River basin. Included is discussion on lock and dam construction, pool maintenance and operation, dredging, and boat traffic.

This report summarizes observations of 1993 flood damage to aquatic and terrestrial vegetation, the influence of the flood on fish species richness and abundance, and sediment transport and accumulation in the upper Mississippi River basin.


Diverting water from Lake Michigan, building drainage and levee districts that constrict the natural flow of water, and putting marginal ground into agricultural production are discussed as examples of how humans have altered the natural habitat and ecosystem of the Illinois River resulting in a diminishing biological resource in aquatic and terrestrial habitat.


This report conducted during the 1920s on flood control of the Illinois River presents accounts of major historical floods and the hydraulics, geology and formation of the river. The report suggests solutions for flood control for specific drainage and levee districts.


The authors identified 132 biologically significant streams in Illinois using criteria used for the Biological Stream Characterization (BSC), an index of stream quality, and data on the biodiversity of
freshwater mussels. The authors identified 108 streams that support mussel populations considered endangered, threatened, or species of concern.


This paper covers the dynamics and changes in the benthic populations of Lake Matanzas, Quiver Lake, and Lake Chautauqua. The scientific findings provide an excellent comparison of the benthic populations found by Richardson in 1913-1915 in relatively clean water and the more polluted waters of the 1950s.


Effects of water quality on plankton and related organisms in the Illinois River around 1930 are discussed. Includes abstracts of previous studies on the biology of the river.


Researchers characterized winter habitats of 17 radio-tagged largemouth bass in the La Grange Pool. The data revealed that bass concentrated in preferred habitats such as backwaters and ditches during the winter. Adequate winter habitat is dependent on stable or rising winter river levels. Management recommendations for improving winter habitat for largemouth bass in the Illinois River are discussed.

This paper describes field observations of fish breeding habits in Illinois River bottomland lakes and wetlands during 1910-1911. Sixteen fish species are discussed with anecdotal information on fish species abundance and behavior. Most of the bottomland lakes and wetlands referred to no longer exist such as Thompson’s Lake, Flag Lake, Dierker Lake, Riley Smith’s Marsh, Deep Slough, and Lynch Slough.


This was a study conducted in the early 1900s on the abundance of bottom fauna in the Illinois River from Chillicothe to Grafton. Researchers found that the most important lakes within that segment are from Peoria to Meredosia and that the most productive parts of the lakes have little slope and low velocity.


Changes that occurred between 1913-1915 and 1921 in composition and abundance of the benthic macroinvertebrates in the Illinois River between Chillicothe and Browning due to increasing levels of pollution are discussed. Documentation of the disappearance of numerous benthic species and families, a reduction in number and biomass of surviving organisms, and appearance of several pollution tolerant forms (Tubificids) are included.


Description of the bottom fauna of six pools of the Illinois River between Chillicothe and Grafton.
Factors causing differences in bottom fauna between pools are explained in the context of hydrographical and physical features. Also discussed is the food of small bottom-invertebrates; aquatic plants of the lakes; nitrogen, organic carbon, and other oxidizable matter in the sediment of the river and lakes; plankton in the river channel; and a general comparison of the Illinois River and its connecting lakes in the food resources of a fishery and in fish output.


This study compares the condition of the bottom fauna of Peoria Lake as found in July-September, 1922, with that of the summer of 1920. Factors causing the destruction of the original bottom fauna of Peoria Lake is discussed. This paper gives an excellent scientific description of the biological damage inflicted on Peoria Lake.


Distribution of benthic macroinvertebrates in the Illinois River around 1923 is compared to that present before severe degradation which resulted from pollution. This study examines the bottom fauna in the 44 miles above and 71.5 miles below Peoria Lake in the Illinois River during 1923. The fauna is separated into three categories: tolerant, species requiring cleaner water, and missing species of the original bottom fauna. It is noted that the greatest injury since 1913-15 occurred in the formerly exceedingly rich section above Havana. In this section of the Illinois River, 70 species did not appear in 1925 which were collected in 1913-15. Species lists are included.

A thorough examination of the changes in the bottom fauna of the Illinois River between the relatively clean water conditions of 1913-1915 and seriously polluted conditions of 1920-1925. Includes distribution of mussels in the Illinois River during each of these time periods. Factors examined include distribution, abundance, and valuation.


This report gives a chronological procession to the development of the Chicago Waterway from the late 17th Century through the mid-twentieth century. Included are maps showing pre-, during, and post-construction geography of the Chicago River.


This study attempted to identify factors that caused declines in fingernail clams (Musculium transversum) in the Illinois and Mississippi rivers. The effects of un-ionized ammonia and Illinois River water were specifically assessed. Findings indicated that fingernail clams were sensitive to low concentrations of ammonia and may have played a role in their decline along the Mississippi. Illinois River water inhibited ciliary activity.


This report summarizes wetland and Illinois bottomland lake use and conflicts between 1880-1920. Land ownership and public use issues during this period are discussed.

Characteristics of amphibians and reptiles are outlined along with distribution data from across the state.


The first comprehensive work on Illinois fishes since Forbes and Richardson’s classic work in 1908, this definitive reference includes information on 199 species of fishes that occur, or did occur, in the state. It places special emphasis on identification, distribution, and changes in both distribution and abundance brought about by man-induced environmental changes. A detailed species account is included.


This paper defines the degradation of the Illinois River beginning in the early 1900s. The effect of contaminants on the Illinois River ecosystem is featured. The rich historical biological diversity and productivity of bottomland lakes is discussed including data on the commercial fishery. Factors leading to the biological degradation of the river are presented. A short discussion of how the upper Mississippi River could have a similar fate as the Illinois River is also presented.

Provides an overview of the Illinois River ecosystem with brief explanations of the hydrology, biological productivity, history, sedimentation, bottomland lakes, agriculture, and aquatic vegetation. Institutional responsibilities and actions in river restoration are noted along with a discussion of restoration techniques. A short discussion of social and biological constraints on river restoration is included.


A description of the Illinois River floodplain, flood pulse, and hydrology sets the stage for further discussion. Problems associated with navigation dams, sedimentation, water levels, and water quality are presented. The author advocates restoring the Illinois River ecosystem by opening larger areas of the floodplain to natural hydrologic processes such as seasonal flooding. Protecting the river from invasive nonnative species is also covered.


Disturbances in river floodplain systems are discussed with specific disturbances related to the Illinois River and Mississippi River floodplains. Arguments for what constitutes a disturbance and some restoration possibilities are presented.

This report provides a summary on the impacts of the construction of a nine-foot navigation channel on the middle Mississippi (Pools 24, 25, 26) and the lower Illinois rivers on fish and wildlife and their habitats. Discussion on the Illinois River includes declines in phytoplankton, zooplankton, and benthos populations. Reduced fish and mussel commercial harvests, as a possible result of the navigation channel, are also discussed. There were 17 mussel species lost after construction in the Alton Pool of the Illinois River. Poor water quality and degraded habitats were attributed to the declines. Construction of the nine-foot channel initially benefitted waterfowl populations by increasing shallow water areas, but higher sedimentation rates quickly reduced this type of habitat after constriction.


Effects on individual mussels and mussel beds of three commercial mussel harvesting methods (braille, dredge, and diving) commonly employed on the upper Mississippi River and its tributaries were investigated. For every mussel taken, the crowfoot bar dislodged 12.4 mussels and damaged none, the basket dredge dislodged 35.3 and damaged 13.8, and the commercial diver dislodged 0.1 and damaged none. Thin-shelled species were most susceptible to damage.


The report characterized the bacterial flora associated with mussels that suffered a die-off between 1982-1986 in the Mississippi River and also for mussel
populations that did not experience a die-off in the Illinois River. The authors identified 37 types of bacteria of which 7 types were exclusively found in the Mississippi River and 15 types were exclusively found in the Illinois River. Dead and/or dying mussels were found to have higher populations of bacteria than healthy mussels.


The authors provide an overview of the hydrological alterations to the upper Mississippi and Illinois rivers. Included in their discussion are topics dealing with the natural hydrograph, effects of levees and dams, and the impacts of the 1993 flood on biological communities associated with flooded areas. The authors make some management recommendations to restore a natural hydrograph including seasonal, controlled flooding; controlled draw downs; and using existing navigation dams to naturalize currently altered flows.


Researchers sampled 24 sites in the Illinois River from 1959 to 1974 with electrofishing equipment to collect fish population data; collary physical/chemical measurements were also taken. Twenty-one fish species are listed individually with information such as the largest annual catch for each species by number and weight, comments about population trends, and distribution within the river system. Considerable discussion about the historical changes in the Illinois River and its fish populations is included.


This study focuses on the sediment deposition into Lake
Chautauqua. A history of Lake Chautauqua is included which describes its brief period as a drainage and levee district followed by its establishment as a U.S. Fish and Wildlife Refuge. The reduction in lake storage capacity, average annual sediment deposition, and total sediment is estimated.


Lake Chautauqua was one of the Illinois River bottomland lakes that was drained for agricultural purposes during the early 1900s. After a flood in 1926, the area was abandoned for agriculture and later became a U.S. Fish and Wildlife Refuge. This paper examines the sport and commercial fishery values of Lake Chautauqua after its restoration.


This is a comprehensive study of the past and present abundance, distribution, and diversity of mussel fauna in the Illinois River. Over 4,000 live mussels were collected by various methods at many sites along the entire length of the river. Each species is discussed individually with information on its historical distribution, present population status, commercial use, fish hosts, and pollution tolerance. Color plates to aid in species identification are included. A separate section provides an in-depth account of the history of the river’s pollution with many references to previous publications.


This paper discussed the demand put on the Illinois River by human uses and the impact that these uses have
had on the ecosystem. Included is an historical
description of the geology and other physical
characteristics prior to human use. Starrett then
proceeds with a chronological description of early
settlement through the establishment of navigation on
the river. Changes on fish populations during the
early- to mid-1900s are also discussed.

117. Starrett, W.C., and A.W. Fritz. 1965. A biological
investigation of the fishes of Lake Chautauqua, Illinois.

This paper is based on a 10-year biological
investigation of the fishes of Lake Chautauqua.
Various types of fishery data were collected from
commercial fishermen and creel censusing of sport
fishermen. Test-net fishing, electrofishing, minnow
seining, and rotenone treatments were also used for
data collection. Species, length, weight, and age of
the fish specimens; total fish removal; age composition
of the catch; fish condition and growth indices; and
changes in fish populations were discussed. Water
levels are discussed in the context of both waterfowl
and fishery management.

fishing at Lake Chautauqua, near Havana, Illinois, in 1950
and 1951. Illinois Natural History Survey Biological Notes
30. 31 pp.

This publication provides detailed information about
the fish populations in Lake Chautauqua in 1950 and
1951. Researchers collected information on the kind
and number of fish caught by anglers, fish species
abundance, fish size, influence of water level on
fishing success, and fishing techniques. Creel
censuses were used to collect fish data along with
minnow seine hauls in late summer to determine spawning
success. Fish habits and fishing techniques for eleven
species are provided.

119. Steffeck, D.W., F.L. Pavleglio, Jr., F.C. Bellrose, and
R.E. Sparks. 1980 Effects of decreasing water depths on the
sedimentation rate of Illinois River bottomland lakes.
This article investigates sedimentation rates of floodplain lakes along the Illinois River. Peoria Lake was reported to have higher sedimentation rates in recent times and was attributed to increased sediment loads from row crop production.


This report discussed the movement of invasive species between the Great Lakes ecosystems and the Illinois River ecosystem. Discussion is focused on the connection between the two systems in the early 1900s to facilitate shipping interests. The movement of zebra mussels is used as an example.


Physical features of the Spoon River, a major tributary of the Illinois River, are described including a list of mussel species collected prior to 1891. Commercial musseling in this river is discussed.


This historic paper includes a description of the Spoon River, a major tributary of the Illinois River, and a listing of the species found there by Strode prior to 1891.


Mollusks at 13 sites in the Kankakee River were surveyed in 1978 to assess present species composition, abundance, and distribution and examine changes that have occurred since surveys in 1906, 1909, 1912, 1953,
1955, 1960, and 1976. Species diversity had steadily declined since 1906, most likely due to pollution, over-harvest, and habitat destruction.


Compared presettlement to present-day wetland distribution and amounts. Quadrangle maps and percentages of wetlands by county are presented.


The water level of the upper Mississippi River is regulated by a series of dams to improve and maintain river navigation. This study investigates the impacts of water level regulation on water quality, plant distribution, and fish communities on three segments of Pool 26.


This report investigated suspended solid and turbidity levels after closure of dams on the upper Illinois River. Suspended solids declined after dam closure at all sample sites. However, suspended solid values were significantly higher after tow traffic resumed. Increases in suspended sediments and turbidity were highly correlated and ranged from 2.4-43.8 mg/l for suspended sediments and 5.0-44.6 Jackson Turbidity Units (JTU). There was no significant relation among benthic macroinvertebrate populations in response to tow traffic.

This is a brief paper describing the collections of the introduced Asiatic clam, *Corbicula manilensis*, in the Illinois River. The date of introduction and range extension of this species in the Illinois River is discussed.


A short summary of the commercial fishing industry along the Illinois River. Specific information on the importance of the common carp are discussed.


The author conducted a mark-recapture study of several centrarchid and other important species to study fish movements during drought on the Illinois River and other major rivers in Illinois. Data on movements of recaptured individuals are presented.


A brief description is provided of the impacts of a fall flood (in 1926) on the vegetation community in the Illinois River floodplain. Mortality of shrubs and trees was attributed to sediment deposition and untimely water inundation.


This article summarizes plant succession on levees constructed on the lower half of the Illinois River. It estimates that climax succession would occur in 50
years of construction and goes progressively through each stage. It identifies the climax trees as maples and elms.


This dissertation segregates the lower Illinois River valley into four general divisions: upland, bluff, transition region, and floodplain. Ten major plant communities were identified within these divisions. Plant species lists, general soil descriptions, landscape position, and hydrology are noted for each plant community. Hydrarch plant succession is discussed in the descriptions of the floodplain plant communities.


Environmental impact assessment of navigation effects on the Illinois River. Major impacts discussed include the effects of dredging that cause temporary changes in water quality (e.g. increased turbidity, discharge of petroleum products and exhaust), dredge material placement, and influence of dam operations on aquatic habitats. A summary of biological information collected during the impact assessment is also included.


This study focused on the amount of waste corn and soybeans in fields and how it relates with tillage practices. In untilled fields the study found that 40 percent of waste corn and 70 percent of waste soybeans had disappeared during the 4-6 weeks from harvest to
late fall. The average amount of waste corn in untilled fields in late fall ranged from 60 to 431 kg/ha (dry weight) annually, and normally declined about 55 percent through early spring. Waste soybeans ranged between 34 and 63 kg/ha annually, and declined about 85 percent by early spring. With erosion and many new agricultural systems pervading the landscapes, resident and migrant wildlife populations will inevitably be affected.


A mussel survey was conducted at a proposed bridge construction site on the Illinois River at Peoria. Two-hundred-twenty-eight individuals representing thirteen species were collected. No endangered species were collected.


Mussel and fish species were surveyed at a proposed bridge replacement project site on the Kankakee River, Illinois, to determine species composition and abundance. Mussel sampling was by wading and hand picking. Seventeen species, 579 individuals, of live mussels were collected during this survey, none of which are considered threatened of endangered. Two
species collected, *Cyclonaias tuberculata* and *Ligumis recta*, were considered to be on the decline in Illinois and were uncommon.


Mussels were sampled at 36 stations on the Kankakee River, Illinois, to investigate their distribution, abundance, and natural history. Thirty-eight mussel species were collected. Limnological data including water depth, temperature, and current speed was recorded at each station. Mussel size, condition, parasite infestations, commercial value, and reproductive periodicity were noted for each species.


This research project determined the rate of flooding mortality on various bottomland tree species and the rate and effect of tree fall. The tolerance of individual tree species to flooding regimes and saturated soils is discussed. A brief discussion concerning plant and animal succession after the death of timber stands is included.


The effects of flooding and waterfowl concentrations on mammals at Lake Chautauqua National Wildlife Refuge were investigated. Flooding caused high mortality in woodchucks, but had little effect on minks. Carnivorous mammals utilized the waterfowl in the area as a food source.

This report is a summarization of a study conducted on the Illinois and Mississippi rivers and their backwaters near their confluence. Raccoons were studied for fur yields and autumn food habits.


This article summarizes information collected on the availability and use of natural cavities by nesting wood ducks. The study was conducted at Sanganois Conservation Area in west central Illinois during 1994 and 1995. The success rate for wood duck nesting was 21.4 percent (3 of 14 nests), and raccoons were the primary predator of wood duck nests. The study concluded that predation rather than nest-site availability limited wood duck production from natural cavities, along with limited numbers of suitable trees due to the flood of 1993.


The author conducted a basin-wide survey of the contaminants found in both sediments and biota. Organochlorine compounds detected in 1989 tended to be highest on the Chicago and Calumet rivers from sediment samples. Similarly, organochlorine compounds in fish bioassays were highest in the Chicago and Calumet rivers, but several compounds were detected in fish from the Des Plaines and lower Illinois rivers.


The authors attempted to identify the vegetation available as food plants during the early-nineteenth century both qualitatively and quantitatively and also tried to provide some spatial reference to the plant communities in the lower Illinois River Valley. Major
observations indicated that vegetation found in the
nineteenth century was similar to that of the Woodland
Period.

144. Zuehls, E.E. 1987. Travel time and dispersion in the
Illinois River, Marseilles to Peoria, Illinois. U.S.

This study investigated the travel time of dye between
Marseilles Dam and Peoria Dam on the Illinois River to
develop a model to predict the dispersion of a solute
spilled into the river. They found that dye dispersion
was affected not only by water velocities but also by
surface winds. Travel times ranged from about 85 hours
at highest flow to 175 at lowest flows tested.
Annotated Subject Index
(Numbers are paper numbers, not page numbers)

Abiotic 73
Abundance 79
Aerial Inventories 54
Agriculture 12, 18, 27, 51, 58, 86, 114, 119, 134
Alluvion 131
Amphibians 102
Aquatic Ecosystems 52
Aquatic/terrestrial Transition Zones 71
Aquatic Vegetation 11, 19, 26, 68, 48, 95, 104
Arthropods 40
Artificial Nest Box 24
Asiatic Clam 127
Atlantic Flyway 28
Bacteria 110
Bald Eagle 54, 55
Banding 18, 50
Behavior 32, 53
Benthic Macroinvertebrates 34, 93
Big Vermilion River 9
Bioassay 142
Bioassessment 88
Biographies 50
Biological Productivity 105
Biomass 94
Biotic 73
Birds 47
Black Crowned Night Heron 31
Bottomland 140
Bottomland Forest 143, 138
Breeding 48
Bulrush 14, 21
Caddisfly 100
Calhoun Point 140
Canvasback 53
Carp 2, 8, 42
Cattails 14, 21
Central Flyway 28
Chautauqua National Wildlife Refuge 16, 139
Chicago Sanitary and Ship Canal 80
Classification 40, 43
Commercial Fishing 2, 27, 41,
Commercial Mussel Harvest 36, 45, 46, 108, 109, 115, 121, 123
Community Structure 111
Composition 77
Condition Indices 117
Conservation 17, 69, 70
Conservation Tillage 134
Conservationists 50
Corbicula manilensis 127
Corn 134
Crane Lake 19
Critical Trends Assessment Project 66, 67
Crustacea 40, 88
Cuba Island 19
Cyclonaias tuberculata 136
Cylindrical Metal Houses 24
Dam Operations 111
Degradation 104
Des Plaines River 41, 58, 99
Development 58, 75, 96, 99, 116
Dissolved Oxygen 96
Distribution 9, 98, 127
Distribution history-
  amphibians and reptiles 102
Disturbance 68, 75, 85, 107
Diversion 22, 52
Diversity 48, 58, 88
Diving Ducks 53
Dominance Index 132
Drainage and Levee Districts 12, 22, 42, 49, 51, 65, 69, 70, 86, 87
Drawdown 13
Drought 25
Duck Island 19
Duck Gizzards 3
Ducks 7, 17
Ecology 9, 23, 30, 103
Economics 27, 69, 70, 128
Ecosystem 30, 65, 66, 107
Ecosystem Dynamics 106
Ecosystem Monitoring 67
Electrofishing 112
Elevations 70
Ellipsaria lineolata 29
Elm 131
Endangered Species 29, 72, 88,
Enhancement 49
Entomology 48
Environmental Conditions 66, 67, 81, 84
Environmental Impact 133
Erosion 134
Extirpation 97
Fauna 93
Fingernail Clams 4, 32
Fish Abundance 2
Fish Behavior 41
Fish Communities 125
Fish Distribution 43, 58, 103
Fish Food Habitats 37
Fish Growth 117
Fish Habitat 43
Fish Harvest 42, 128
Fish Identification 103
Fish Management 57
Fish Mortality 85
Fish Movement 129
Fish Populations 8, 35
Fish Survey 8
Fish Wintering Habitat 91
Flood 25, 69, 70, 74, 85, 130, 138, 139, 141
Flood Control 12, 87
Flood Pulse 71, 74, 77, 106, 107, 111, 125
Flood Tolerance 138
Floodplain 54, 57, 65, 71, 73, 75, 85, 91, 101, 106, 107, 111, 131, 143
Floodplain Lake 2, 10, 11, 12, 22, 26, 27, 42, 68, 78, 77, 86, 89, 92, 93, 95, 101, 104, 105, 114, 132
Food Web Dynamics 95
Forested Wetland 141
Freshwater Stream 100
Fur Yield 140
Gear Bias 76
Geese 17
Geologic History 26, 51
Geology 69, 70, 77, 87
Goby 120
Grass Carp 120
Great Egret 31
Great Blue Heron 31
Habitat 71, 100, 131, 135, 143
Habitat Loss 86
Havana 47
Heavy Metal 142
Heronry 31
Human Impacts 22, 53, 86, 116
Hunter Compliance 7
Hunters 15
Hydrologic Cycle 65
Hydrology 11, 43, 61, 62, 74, 77, 85, 87, 93, 95, 105, 106, 111, 117, 124, 132, 144
Illinois 9
Illinois and Michigan Canal 80
Illinois River Valley 10, 19, 21, 52, 83
Impoundments 66
Industrial Sewage 51
Ingested Shot 5
Insects 47, 48
Intraspecific Competition 25
Invasive Species 1, 106, 120
Invertebrate 85
Islands 132
Kankakee River 33, 34, 41, 72, 123, 136, 137
Kaskaskia River 39
La Grange Pool 52, 56
Lacustrine 124
Lake Chautauqua 15, 89
Lake Michigan 52
Lake Michigan Diversion 56
Lampsilis higginsi 29
Largemouth Bass 91
Lead Fishing Sinkers 7
Lead Poisoning 5, 6, 7, 16
Lead Shot 6, 16
Legislation 5
Lesser Scaup 53
Levees 27, 131, 139
Life History
  amphibians/reptiles 102
  fish 41
  mussels 137
  zebra mussel 1
Ligumia recta 136
Live-trap 16
Long Term Ecological Research 30
Peoria 52
Peoria Lake 96, 97, 98
Peoria Pool 56
Pesticides 55
Phosphorus 62
Physiology 9, 63
Phytoplankton 68, 79
Plankton 37, 38, 42, 44, 76, 77, 90, 95
Plant Associations 47
Plant Communities 132
Plant Distribution 125
Plant Succession 131
Plant Species List 132
Poisoning 55
Policy 105
Pollution 9, 36, 41, 62, 64, 80, 89, 94, 96, 97, 98, 115, 116, 123, 133, 142
Pollution Dispersion 144
Potassium 4
Predation 24, 139, 141
Presettlement 124
Propagation 23
Protozoa 59, 60
Public Land 101
Public Shooting Areas 13
Quiver Creek 24
Raccoon 140
Reclamation 131
Recovery 107
Recreation 69, 70, 114, 118
Refuge 15
Rehabilitation 49
Reptiles 102
Restoration 22, 49, 61, 62, 73, 105, 106, 107
Riverine 23, 124
Rotifera 59, 60
Rudd 120
Ruffe 120
Sangamon River 74
Sanganois 55
Seasonal Distribution 79
Sediment 2, 8, 32, 44, 85, 89, 95, 126, 130, 142
Sedimentation 22, 26, 34, 51, 63, 68, 91, 104, 105, 108, 119, 133, 134
Sediment Deposition 113
Seed Yields 83
Sewage 42, 97, 98
Shot Ingestion 7
Shot-in pellets 7
Site-specific Management 65
Soils 132
Soybeans 134
Spawning Habits 92
Species Composition 68, 78
Spoon River 122
Sport Fishing 27
Steel Shot 6
Submerged Plants 10
Succession 132
Survival 109
Swans 17
Tazewell County 31
Terrestrial Ecosystem 52
Topography 43, 93
Toxicity 32
Tree Mortality 138
Turbidity 2, 26, 77, 126, 112
Urbanization 58
Vegetation 14, 21, 60, 75, 77, 83, 85, 107, 130, 143
Vegetation Mortality 130
Water Chemistry 142
Water Depths 26
Water Diversion 80
Water Quality 4, 35, 41, 42, 44, 52, 61, 62, 64, 73, 77, 80, 81, 85, 86, 88, 90, 94, 96, 98, 99, 106, 112, 113, 115, 125, 126, 133, 137, 144
Water Levels 25, 42, 52, 91
Water Level Fluctuation 10, 11, 21, 63, 68, 119
Water Level Regulation 125
Waterbirds 50
Waterfowl 5, 6, 10, 15, 18, 27, 28, 38, 56, 57, 63, 83, 139
Waterfowl Breeding Ecology 18
Waterfowl Die-offs 5, 16
Waterfowl Distribution 53
Waterfowl Food Habits 3, 5, 10, 11, 15, 19, 20, 50
Waterfowl Habitat 13, 23, 139
Waterfowl Harvest 6
Waterfowl Hunters 13
Waterfowl Management 13, 17
Waterfowl Migration 18, 53
Waterfowl Nesting 50
Waterfowl Populations 18, 49, 50, 23, 28
Waterfowl Species 17
Waterfowl Survival 53
Watershed 87
Wetlands 17, 26, 28, 49, 50, 58, 61, 62, 66, 73, 101, 124, 141
Wetland Distribution 124
Wetland Habitat 124
Wetland Management 49
Wetland Resources 124
Wildlife 35, 65, 134
Wildlife Management 57
Wildlife Resources 12
Wind 68
Wintering Grounds 15, 28
Wood Duck 23, 24, 141
Wood Duck Breeding Population 24
Zebra Mussel 1, 120
Zooplankton 59, 60, 78, 79, 108
Non-annotated Bibliography


64. Chicago District, Corps of Engineers, Department of the Army. 1975. Preliminary investigation of the downstream effects
on the Illinois Waterway of an increase in Lake Michigan

1975. Environmental inventory and assessment of navigation pools
24, 25, & 26, upper Mississippi and lower Illinois rivers, an
aquatic analysis. USACOE Technical Report Y-75-2. Environmental
Effects Laboratory, U.S. Army Engineers Waterways Experiment
Station, Vicksburg, Miss. 137 pp.

river and its resources. The Living Museum 49(2/3):30-32.

"river rats." The Living Museum 50(3):42-44.

68. Colten, C.E. 1992. Illinois River pollution control,
1900-1970. Pages 193-214 in Larry M. Dilsaver and Craig E.
Colten, eds. The American environment. Rowman and Littlefield
Publishers, Inc.

69. Committee on Restoration of Aquatic Ecosystems: Science,
Technology, and Public Policy; Water Science and Technology
Board; Commission on Geosciences, Environment, and Resources; and
ecosystems: science, technology, and public policy. National

70. Craig, W. 1898. On the fishes of the Illinois River system

71. Curtis, G.W. 1986. Sources of climatologic, hydrologic,
and hydraulic information in the Illinois River basin, Illinois,

21 pp.

wetlands in the conterminous United States, mid-1970s to mid-

74. Dahlgren, R.B. 1988. Human disturbances to migrating and
wintering waterfowl: an annotated bibliography. U.S. Fish and


91. Forbes, S.A. The condition of the Illinois River as affected by the discharge of sewage from the Chicago Drainage Canal, with special reference to fish life, Appendix to the report of the Sanitary District's Commission on sewage disposal and water power. 39 pp.


Planning with assistance from The Nature of Illinois Foundation. 182 pp.


214. Lubinski, K.S., and H.H. Seagle, Jr. 1980. Information summary of the physical, chemical, and biological effects of...


261. Rodgers, S., T. Blackburn, D. Dieterman, H. Langrehr, J.


290. Sparks, R.E. 1977. (2 edn.) Environmental inventory and assessment of navigation Pools 24, 25, and 26, Upper Mississippi and Lower Illinois Rivers. University of Illinois, Water Resources Center, Urbana-Champaign, IL. Special Report No. 5. 82 pp. + tables. (First edition was published by the U.S. Army Engineer Waterways Experiment Station as Contract Report Y-75-4, dated December 1975.)

291. Sparks, R.E. 1979. The impacts of farming on important wetland resources and water quality. The Agriculture Committee, Conservation and Credit Subcommittee, and the Science and Technology Committee, Natural Resources and Environment Subcommittee. 6 pp.


Natural History Survey Biological Notes No. 25. 35 pp.


357. Tucker, J.K., C.H. Theiling, K.D. Blodgett, and P.A. Thiel. 1993. Initial occurrences of zebra mussels (Dreissena polymorpha) on freshwater mussels (Family Unionidae) in the upper


367. U.S. Army Engineer Division. 1978. Summary report of fish and wildlife habitat changes resulting from the construction of a


382. U.S. Army Engineer Waterways Experiment Station. Bibliography navigation Pools 24, 25, and 26, upper Mississippi and lower Illinois rivers. U.S. Army Engineer Waterways Experiment Station. Environmental Effects Laboratory, Vicksburg, MS. 82 pp.


Department of Conservation, Springfield. 426 pp.


Non-Annotated Subject Index

(Numbers are paper numbers, not page numbers.)

Aerial Foraging 203

Agriculture 26, 103, 125, 142, 143, 155, 156, 157, 163, 165, 166, 167, 168, 176, 227, 228, 253, 260, 291, 298, 314, 329, 334, 351, 353, 373, 398

Aircraft 25, 74, 75

Alimentary Organs 94

Alton Pool 389

Ammonia 33, 57, 268, 309, 311, 315, 316, 317, 384, 385, 386

Animal Communities 112

Annotated Checklist (aquatic vegetation) 255

Aquatic Biology Research 288

Aquatic Ecology 32

Aquatic Ecosystem Restoration 297

Aquatic Habitats 85, 264, 303, 367, 400, 401

Aquatic Insects 203, 315

Aquatic Plants 12, 68, 83, 122, 169, 221, 233, 234, 248, 254, 255, 261, 262, 267, 275, 289, 296, 303, 367, 410

Aquatic Populations 389

Aquatic Systems 328

Aquatic Vegetation Monitoring 261, 262

Aquifer 397

Archeology 87, 168

Arsenic 37

Assessment 312

Bacteria 116, 210, 239

Bald Eagle 19, 134, 200, 201, 202, 266

Bank Stabilization 35

Bank Swallow 203

Banner Marsh 380

Barge Traffic 178, 344

Barges 79, 162, 186, 306, 354

Barn Swallow 203

Beardstown 227, 408

Beech-maple 177

Benthic Organisms 65, 238, 258, 276, 384, 385, 386

Bibliography 71, 74, 75, 80, 102, 156, 195, 267, 298, 323, 382, 415

Bighead Carp 355
Bioassay 43, 215, 312, 316, 317
Biodiversity 177, 301
Bioindicator 215
Biological Control 356
Biological Oxygen Demand (BOD) 384, 385, 414
Biological Survey 101
Biology 80
Biomass 41
Biota 328
Bird Checklist 259
Bird Populations 41, 88, 114
Birds 25, 46, 89, 103, 113, 114, 198, 259, 323
Birdwatching 13
Black-crowned Night Heron 39
Black Duck 28
Boat Traffic 287
Boating 35, 74, 75
Bottom Fauna 11, 231
Bottomland 164, 227
Bottomland Forest 345
Bottomland Lake Productivity 219
Buffalofish 325
Calcium 170, 305
Calumet River 15
Canada Goose 119
Canvasbacks 130
Carbon Dioxide 177
Carp 6, 212, 213, 256, 315, 325, 356
Catch Rate 208
Catfish 79, 325, 354
Channelization 142
Chautauqua Lake 123, 124, 225, 231, 264, 321, 322
Chautauqua National Wildlife Refuge 23, 200, 202
Chemicals 60, 61, 116
Chicago 15, 68, 370, 407
Chicago Drainage Canal 91
Chicago River 15
Chicago Sanitary and Ship Canal 13, 80, 232, 238, 271
Chicago Waterway 269
Classification Key 189
Cliff Swallow 203
Climate 71, 114, 157, 387, 397
Fire 204
Fish Classification 95, 180
Fish Communities 182, 197, 199
Fish Culture 92
Fish Disease 209, 347
Fish Distribution 95, 98
Fish Fauna 182
Fish Food Habits 82, 92, 93, 94, 95, 96, 99, 102, 317
Fish Growth 349.
Fish Habitat 142, 247
Fish Hatcheries 50, 154
Fish Management 76, 153, 154, 349
Fish Movement 79
Fish Populations 33, 54, 77, 151, 187, 197, 199, 205, 208, 209, 303, 313, 324, 350
Fish Production 317, 349
Fish Removal 146
Fish Sampling 205
Fisheries 78, 120, 153, 154,

249, 294, 299
Fishermen 325


Fishing 74, 75, 122, 273
Fleeting 306
Flood 55, 71, 298, 299, 301, 363, 397
Flood Control 55, 265, 373
Flood of 1993 158, 229, 254, 383
Flood Pulse 295, 299, 300, 301, 314, 343
Flooding 4, 5, 40, 78, 111, 120, 122, 163, 183, 296, 343
Floodplain 41, 89, 107, 112, 145, 164, 201, 228, 229, 230, 251, 264, 284, 296, 297, 298, 299, 301, 310, 323, 341, 343, 351, 352, 360, 363, 389, 411
Floodplain Forest 88, 201, 204, 359
Floodplain Grasslands 359
Floodplain Lake 6, 17, 61, 123, 124, 219, 227, 235,
<table>
<thead>
<tr>
<th>Term</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missouri River</td>
<td>314</td>
</tr>
<tr>
<td>Mixed-species Foraging Flock</td>
<td>203</td>
</tr>
<tr>
<td>Moist-soil Management</td>
<td>103, 146</td>
</tr>
<tr>
<td>Moist-soil Plants</td>
<td>83, 184, 221, 275, 296</td>
</tr>
<tr>
<td>Mollusks</td>
<td>11, 84</td>
</tr>
<tr>
<td>Molt Migration</td>
<td>192, 193</td>
</tr>
<tr>
<td>Monitoring</td>
<td>15, 199, 263, 313, 317, 333, 342, 414</td>
</tr>
<tr>
<td>Municipal Water Supply</td>
<td>175</td>
</tr>
<tr>
<td>Mussel Harvest</td>
<td>106</td>
</tr>
<tr>
<td>National Wetland Inventory</td>
<td>72, 73</td>
</tr>
<tr>
<td>Native Americans</td>
<td>87, 260, 277</td>
</tr>
<tr>
<td>Natural Areas</td>
<td>152, 403</td>
</tr>
<tr>
<td>Natural Resources</td>
<td>66, 126, 160, 161</td>
</tr>
<tr>
<td>Natural Tree Cavity</td>
<td>412, 413</td>
</tr>
<tr>
<td>Naturalist</td>
<td>63</td>
</tr>
<tr>
<td>Nature Preserves</td>
<td>159, 339</td>
</tr>
<tr>
<td>Navigation Channel</td>
<td>30, 85, 125, 230, 367</td>
</tr>
<tr>
<td>Navigation Effects</td>
<td>58, 278, 287, 303, 367, 369, 376, 378</td>
</tr>
<tr>
<td>Nest Success</td>
<td>412, 413</td>
</tr>
<tr>
<td>Nitrification</td>
<td>57</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>12, 312, 384, 385, 386</td>
</tr>
<tr>
<td>Northern Rough-winged Swallow</td>
<td>203</td>
</tr>
<tr>
<td>Nutrient Transport</td>
<td>191</td>
</tr>
<tr>
<td>Nutrition</td>
<td>103</td>
</tr>
<tr>
<td>Oak-hickory</td>
<td>177</td>
</tr>
<tr>
<td>Oligochaeta</td>
<td>280, 281, 282</td>
</tr>
<tr>
<td>Omnivorous</td>
<td>92</td>
</tr>
<tr>
<td>Organic Carbon</td>
<td>60</td>
</tr>
<tr>
<td>Organism</td>
<td>328</td>
</tr>
<tr>
<td>Oxygen</td>
<td>33, 56, 177</td>
</tr>
<tr>
<td>Oxygen Demand</td>
<td>56</td>
</tr>
<tr>
<td>Paddlefish</td>
<td>82</td>
</tr>
<tr>
<td>Palustrine</td>
<td>404</td>
</tr>
<tr>
<td>Parameter</td>
<td>25</td>
</tr>
<tr>
<td>Parasites</td>
<td>324</td>
</tr>
<tr>
<td>Peat</td>
<td>392</td>
</tr>
<tr>
<td>Peoria</td>
<td>68, 211, 252, 326, 408, 410</td>
</tr>
</tbody>
</table>
Peoria Lake 24, 34, 51, 61, 68, 123, 124, 185, 220, 225, 258, 271, 338, 361, 370, 374, 375

Peoria Pool 364

Phosphates 338

Photography 63

Phytoplankton 12

Pileated Woodpecker 412, 413

Plankton 65, 81, 82, 188, 384, 385, 386

Plants 90, 107, 229, 382

Pleodorina 188

Policy 69, 273, 299


Ponds 100

Pool Regulation 65

Populations 89, 179, 328

Pore Water 316

Potassium 3, 169, 170

Power Plants 333

Prairie 155, 266

Precipitation 383

Presettlement 228, 229, 260, 277

Presettlement Wetland 345

Private Land 273

Productivity 101, 285

Property Taxes 329

Public Health 414

Public Land 273

Purple Martin 203

Quiver Creek 392

Quiver Lake 231, 271

Raccoons 53

Radioactivity 173

Reclamation 5

Recolonization 318, 319, 320

Recreation 63, 74, 75, 105, 153, 163, 164, 200, 201, 202, 222, 297, 326, 390

Recruitment 332

Recycling 155

Red-headed Woodpecker 204

Refuges 24, 50, 75, 222

Rehabilitation 146, 294, 380

Reintroduction 44
Turtles 62, 225
Tributaries 328
Tri-County 192
Unionid Mussel 335, 337, 358
U.S. Fish and Wildlife Service 72, 73
U.S. Soil Conservation Service 19
Upland Game Birds 270
Urbanization 66, 143, 404
Vascular Plants 255, 275
Vegetation 83, 146, 167, 184, 228, 342, 360, 361, 374, 388, 392
Velocities 363
Wading Birds 40
Walleye 144
Waste Grain 398
Water Development 387, 388
Water Levels 12, 116, 136, 184, 221, 233, 295, 327
Water Management 265
Water Resources 160, 288, 414
Water Supply 51
Waterfowl 7, 8, 21, 23, 24, 25, 26, 66, 74, 75, 78, 103, 120, 129, 130, 141, 145, 146, 200, 202, 296, 303, 358, 367, 374
Waterfowl Banding 26
Waterbird Breeding Ecology 24, 26, 40, 192
Waterfowl Distribution 108, 109, 131, 132, 133
Waterfowl Flyways 23, 24
Waterfowl Food Habits 141, 216, 221, 271
Waterfowl Habitat 141, 190
Waterfowl Harvest 20, 22, 139
Waterfowl Hunting 20, 21, 141
Waterfowl Inventories 20, 108, 109, 131, 132, 133, 139
Waterfowl Migration 24, 26, 139, 141
Waterfowl Populations 22, 29, 134
Waterfowl Research 29, 141
Watershed 165, 329
Waterways 66, 370, 408
Wave Action 186

Wetlands 51, 72, 73, 103, 137, 138, 143, 145, 146, 155, 157, 176, 190, 237, 271, 275, 277, 283, 291, 296, 352, 374, 375, 389, 392, 397, 404

White Pelican 18

Whitefish 92

Wild Celery 12, 34, 235

Wildlife 4, 54, 142, 163, 225, 266, 298, 301, 303, 314, 367, 374, 382, 387, 388

West-central Illinois 192

Wood Duck 27, 53, 104, 110, 140, 412, 413

Zebra Mussels 332, 356, 357

Zinc 37, 305

Zooplankton 188, 189, 331, 395, 396
Available Data Sets from Completed Projects
Illinois River Biological Station and Forbes Biological Station, Havana, Illinois


2. Chautauqua larval fish abundances and/or escapement (1996-98, 2000).

3. Chautauqua zooplankton abundances and/or escapement (1997-98).


   Water quality, vegetation, fish, and macroinvertebrate data are on-line and linkable through the USGS UMESC website (http://wwVw.umesc.usgs.gov) for the La Grange Reach.


   Species information from sample sites throughout the Illinois River.


