

RICHARD J. NEVES

GB
1205
IS 1971

L SCIENCES

ograph Series

SON DANIEL OKUN
University of North Carolina
Department of Environmental
Sciences and Engineering
Chapel Hill, North Carolina

, Second Edition.

HEMICAL MUTAGENS: Environ-

litors, PHYSIOLOGY, ENVIRON-

E ON MAN, 1970

ETHODS, 1970

MONARY REACTIONS TO COAL

CONTAMINANTS AND HUMAN

ENTAL FACTORS IN RESPIRA-

, editors, MUTAGENIC EFFECTS
S, 1972

JAMES A. McCANN, editors, RIVER

and ROBERT W. BULLARD, PHYSIO-
ountain

s, MULTIPLE FACTORS IN THE
INDUCED DISEASE

River Ecology and Man

EDITED BY

Ray T. Oglesby

Department of Natural Resources
Cornell University
Ithaca, New York

Clarence A. Carlson

New York Cooperative Fisheries Unit
Cornell University
Ithaca, New York

James A. McCann

Massachusetts Cooperative Fisheries Unit
University of Massachusetts
Amherst, Massachusetts

Proceedings of an International
Symposium on River Ecology and
the Impact of Man, Held at the
University of Massachusetts,
Amherst, Massachusetts,
June 20-23, 1971

Academic Press



1972

New York and London

MAN AND THE ILLINOIS RIVER

William C. Starrett

The purpose of this paper is to discuss the important uses man has made of the Illinois River (State of Illinois, U.S.A.) and its basin and the impact these uses have had on the ecosystem of the river and its bottomland lakes.

The geographical location of the Illinois River has made it one of the important rivers in America for man and the development of some of his cultural activities (Figure 1). During the past century some of these activities have had adverse effects on the biota of the Illinois River and its adjoining bottomland lakes (Mills, Starrett, and Bellrose, 1966; Starrett, 1971). A number of biological and chemical studies were conducted on the Illinois River between 1874 and 1930 (Calkins, 1874; Forbes, 1878; Hart, 1895; Kofoid, 1903; Baker, 1906; Forbes and Richardson, 1908, 1913, and 1919; Bartow, 1913; Danglade, 1914; Malloch, 1915; Richardson, 1921*a* and *b*, 1925*a* and *b*, and 1928; Greenfield, 1925; Hoskins, Ruchhoft, and Williams, 1927; Boruff and Buswell, 1929; Purdy, 1930; and others). These and later investigations conducted on the river by the Illinois Natural History Survey and other state and federal agencies have made it possible for us to determine some of the changes which have occurred in the ecosystem of the Illinois River resulting from the impact of man.

Description of the Illinois River

The Illinois River is formed in northeastern Illinois, about 48 miles (77.2 km) southwest of Chicago at the confluence of the Des Plaines and Kankakee rivers (Figures 1 and 2) and gently flows 272.9 miles (439.2 km) across the state to Grafton, Illinois, where it empties into the Mississippi River (above St. Louis, Missouri). The former or natural drainage area of the river was about 28,200 sq miles (73,038 km²). Man increased the drainage area to 29,010 sq miles (75,136 km²)¹ by reversing the flow of the Chicago and Calumet rivers and

¹The drainage basin of the Illinois River is divided as follows: 85.5% in Illinois, 11.0% in Indiana, and 3.5% in Wisconsin. About 44.0% of the State of Illinois is drained by the Illinois River system. Barrows (1910) states that the basin of the river is 32,081 sq miles (83,089.7 km²).

ms occurring per square meter in the section of the Illinois River in 1915, (p. 10)

Average number per m ²		
1920*	1922**	1964-1965***
371	20,400	2,956
663	-	797
0	-	0
29	51,229	0
0	-	0
43	431	2,354
240	-	423
0	-	0
4	2,081	0
0	-	22
0	-	1,326
397	-	534
10	-	0
0	-	0
0	-	0

Limnodrilus spp.) in Upper Peoria have become more favorable for were in the 1920's (Table 2). Bot- (unpublished) conducted in 1964 and from the source of the river down- entirely of Tubificidae worms and the mouth of the river pollution community. In this lower section in

1964 and 1965 *Hexagenia* nymphs, Sphaeriidae, and Gastropoda still occurred in the benthic community together with an abundance of Tubificidae worms and Chironomidae larvae. In 1915 Tubificidae worms were scarce in Richardson's (1921a) collections between Peoria Lake and the mouth of the river.

Fingernail clams (Sphaeriidae) virtually disappeared from the river above Beardstown in the mid-1950's (Paloumpis and Starrett, 1960 and unpublished). These organisms were an important food item in the river and its bottomland lakes for carp and diving ducks (Aythyinae), particularly the lesser scaup duck (*Aythya affinis*). Following the disappearance of the fingernail clams, a sharp decline occurred in the numbers of lesser scaups using the middle section of the river and its lakes during migration (Mills et al., 1966). In the 1960's fingernail clams formed 50.2% (volume) of the food items taken by carp collected in the river between Beardstown and its mouth (Starrett and Paloumpis, unpublished). Only one fingernail clam was found in the food contents of the carp examined from the remainder of the river. Tubificidae worms comprised only 4.3% (volume) of the food ingested by carp taken from the section of the river between Beardstown and the mouth, whereas in the upper river (source to Starved Rock dam), where there was a virtual absence of fingernail clams, carp fed heavily upon Tubificidae worms (30.5% volume). Carp collected during the early 1960's from the lower section of the river, where fingernail clams formed an important part of their diet, were deeper bodied than those taken from the remainder of the river (Mills et al., 1966).

The naiads, also, are an important group of animals in the benthic community of the river. In the early 1900's the Lower Illinois River was considered the most productive naiad stream per mile in America (Danglade, 1914). Later, pollution had a serious effect on the naiads of the entire river. A recent study indicated that at least 49 kinds of naiads were present before 1900, and by the late 1960's 25 of these had become extirpated from the river primarily by pollution (Starrett, 1971). Naiads not only are an important constituent of the benthic community, but also serve as an important source of food for the channel catfish (*Ictalurus punctatus*). Except for a short stretch of the river in the vicinity of Peoria, naiads now occur abundantly only between Beardstown and the mouth of the river (*ibid.*). In this lower section of the river in the 1960's naiads comprised 25.2% (volume) of the food eaten by channel catfish (Starrett and Paloumpis, unpublished). None of the catfish examined from other parts of the river contained naiads.

The author also considers the plankton community a basic component of the ecosystem of the Illinois River. In the 1890's Kofoid (1903) computed the total annual production of plankton in the Illinois River to be 67,750 m³. In the