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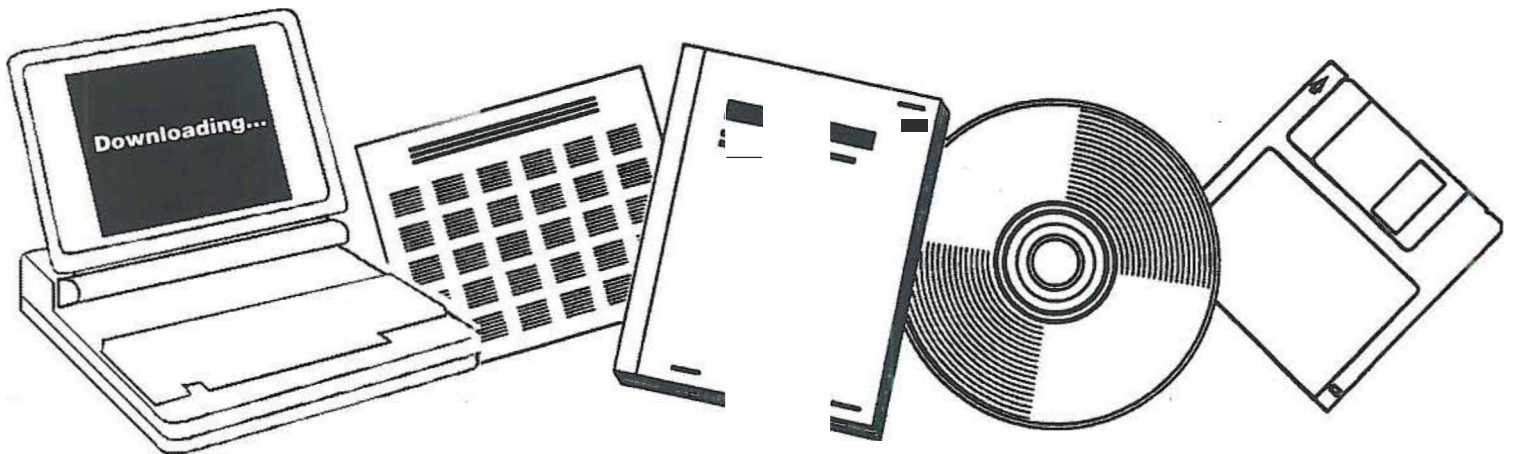
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# THE DEVELOPMENT OF FISHERY COMPARTMENTS AND POPULATION RATE COEFFICIENTS FOR USE IN RESERVOIR ECOSYSTEM MODELING

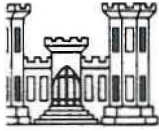
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CONTRACT REPORT Y-77-1

# THE DEVELOPMENT OF FISHERY COMPARTMENTS AND POPULATION RATE COEFFICIENTS FOR USE IN RESERVOIR ECOSYSTEM MODELING

by

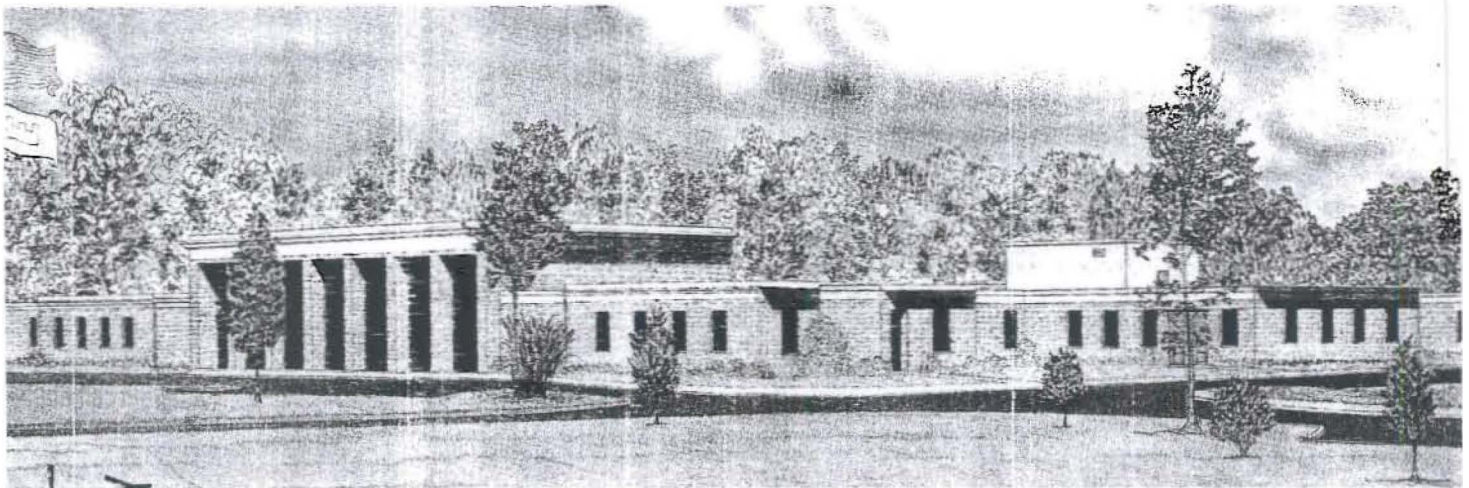
George R. Leidy, Robert M. **Jenkins**

USDI **Fish** and **Wildlife** Service  
National Reservoir Research Program  
**Fayetteville**, Arkansas

**June** 1977

Final Report

Approved For Public Release; Distribution Unlimited



Prepared for **Office, Chief of Engineers**, U. S. Army  
Washington, D. C. 20314

Monitored by Environmental **Effects Laboratory**  
U. S. Army Engineer **Waterways** Experiment **Station**  
P. O. Box 631, Vicksburg, Miss. 39180

Under Agreement No. WES-76-2

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

12

REPORT DOCUMENTATION PAGE

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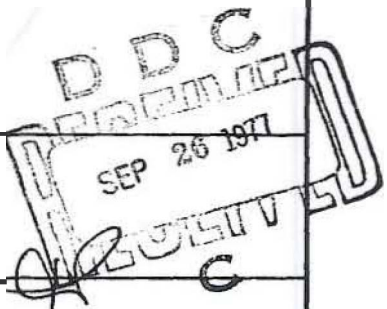
1. REPORT NUMBER Contract Report 1-77-1 ✓	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER 9
4. TITLE (and Subtitle) THE DEVELOPMENT OF FISHERY COMPARTMENTS AND POPULATION RATE COEFFICIENTS FOR USE IN RESERVOIR ECOSYSTEM MODELING.	5. TYPE OF REPORT & PERIOD COVERED Final report	
7. AUTHOR George B. Reid Robert A. Jenkins	6. PERFORMING ORG. REPORT NUMBER	
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Fish and Wildlife Service National Reservoir Research Program Fayetteville, Arkansas 72701	8. CONTRACT OR GRANT NUMBER(s) Agreement o. WES-76-2	
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314	12. REPORT DATE June 1977	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
10. CONTROLLING AGENCY NAME & ADDRESS (if different from Controlling Office) Environmental Effects Laboratory U. S. Army Engineer Waterways Experiment Station P. O. Box 631, Vicksburg, Miss. 39180	13. NUMBER OF PAGES 134	15. SECURITY CLASS. (of this report) Unclassified
15. DECLASSIFICATION/DOWNGRADING SCHEDULE		

6  
12

11

16. DISTRIBUTION STATEMENT (of this Report)  
Approved for public release; distribution unlimited.  
12/24/77

17. DISTRIBUTION STATEMENT (of this abstract included in Block 20, if different from Report)  
12/ WES-CR-Y-77-1



18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on separate sheet if necessary and identify by block number)  
Ecology Models  
Ecosystems Reservoirs  
Fisheries  
Fishes

20. ABSTRACT (Continue on separate sheet if necessary and identify by block number)  
The results of analyses designed to develop model fishery compartments and associated fish population rate coefficients on a regional basis for use in reservoir ecosystem modeling are presented. Emphasis is directed toward development of regional rate coefficients for the United States corresponding to major geographical drainage areas. Fishery data will be incorporated in the reservoir ecosystem model currently being developed by personnel of the Environmental Effects Laboratory, U. S. Army Engineer Waterways Experiment Station.  
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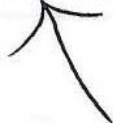
## 20. \_ ABSTRACT (Continued).

cont. Known physical, chemical, and fishery conditions in 187 Corps of Engineers (CE) impoundments larger than 500 acres are described. Multivariable equations are presented that allow estimation of standing crop and sport fish harvest in CE reservoirs.

The development of fishery compartments and population rate coefficient is described. Five fish compartments and their corresponding food compartments were developed to describe the feeding of reservoir fish populations. The fish compartments are p. scivores, planktivores, benthos feeders, detritivores, and fish that feed on terrestrial food sources. The five food compartments corresponding to these fish compartments are, respectively, prey fishes, zooplankton, benthos, organic, detritus, and terrestrial organisms. Fish biomass is proportioned among these compartments on a regional basis.

The relations among fishery compartments and to other fish population parameters were investigated. Where applicable, regional rate coefficients were developed for fish production, reproduction, recruitment, growth, mortality, and sport and commercial harvest.

Data were also reviewed and summarized on the ecological growth and assimilation efficiencies of fish, food consumption rates, respiration rates, temperature tolerances, half-saturation constants for growth, and chemical composition. Text and appendices detail the results of these various studies.



PREFACE

The work described in this report **was** performed under cooperative agreement No. WES-76-2, between the U. S. **Army** Engineer Waterways Experiment Station (WES), Environmental Effects Laboratory (EEL), Vicksburg, Mississippi, and the U. S. Department of the Interior, Fish and Wildlife Service, National Reservoir Research **Program** (NRRP), Fayetteville, Arkansas, signed 3 November 1975. The research **was** funded through the Civil Works Environmental Impact Research Program, Office, Chief of Engineers (aCE).

The research **was** conducted and the report **written** by Mr. G. R. Leidy and Mr. R. M. Jenkins of the NRRP. The efforts of Mrs. J. A. Bilbrey for typing and proofing the text, tables, figures, and appendices of this report are acknowledged.

Dr. K. W. Thornton, Ecosystem Research and Simulation Division (ERSD), EEL, **was** the Contract Monitor and was responsible for the performance of the agreement. The study was under the supervision of Mr. D. L. Robey, Chief, Ecosystem Modeling Branch, ERSD, and Dr. R. L. Eley, Chief, ERSD, and the general supervision of Dr. J. Harrison, Chief, EEL. The aCE Technical Monitor **was** Mr. John Bushman.

Commanders and Directors of WES during the study and preparation of this report were COL G. H. Hilt, CE, and COL J. L. Cannon, CEo. Technical Director was Mr. F. R. Brown.

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CONVERSION FACTORS, U.S. TO METRIC (51)  
UNITS OF MEASUREMENT

**U.S. customary units of measurement used in this paper can be converted to metric (5r) units as follows:**

Multiply	By	To Obtain
<b>inches</b>	25.4	<b>millimeters</b>
<b>feet</b>	0.3048	<b>meters</b>
<b>miles</b>	1.609344	<b>kilometers</b>
<b>square miles</b>	2.58999	<b>square kilometers</b>
<b>acres</b>	0.40468	<b>hectares</b>
<b>acres</b>	0.0040468	<b>square kilometers</b>
<b>acre-feet</b>	1.234	<b>megalitres*</b>
<b>pounds</b>	453.5923	<b>grams</b>
<b>pounds per acre</b>	1.120851	<b>kilograms per hectare</b>

**\* 1 megalitre - *106* litres = 1000 cubic meters.**