

## PHYSIOLOGICAL INVESTIGATIONS

The work of a fishery laboratory includes much effort of a routine nature without evaluation of the reasons or principles behind the work. An excellent case in point concerns age and growth studies. On the species level, such studies are primarily concerned with the rates involved but not with the principles of growth, *sensu strictu*. Similarly, the biologist studies the food intake of various species, but not the intrinsic metabolic system that requires this energy input. These more general problems are basic and require research toward the end that the Woods Hole Laboratory may eventually understand the fish community as an interacting group of species living in, what may turn out to be, delicate adjustment, one to the other. Our needs for this investigation are clear--we need a measure of the metabolic rates, as measured by simple metabolic processes such as oxygen consumption, of the various ecologically important species of fishes. Food intake and growth are directly related to metabolism and both are of extreme importance in an understanding of a fish's role in its environment. Metabolic rates are controlled in large part by the environment, especially by its temperature, and are perhaps the principal factors to be considered when discussing the distribution and abundance of various species in a changing environment.

August 6, 1959

## PHYSIOLOGICAL INVESTIGATIONS

### List of Projects

1. Oxygen consumption of various groundfish species
2. Oxygen consumption changes in size change
3. Metabolic and food intake
4. Role of environment factors on spawning
5. Role of environment factors on aggregation



U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: The seasonal  $O_2$  consumption of various groundfish species

Investigation Title: Physiology

Investigation Chief: R. L. Edwards

Project Leader: Vacant

Name	Title	Grade
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Assistants: (Title and Grade)

Collaborators:

Need for Information:  $O_2$  consumption varies with a change in temperature. It has been demonstrated that, following acclimation, the curve of  $O_2$  consumption assumes a specific level, differing markedly from that at another acclimation temperature. A marked seasonal variation is therefore to be expected, whatever the ambient temperature. Since the oxygen requirement of not one of our major fish species is known, such work as this will supply much needed data even at the routine level of experimentation.

Objective: To determine seasonal variations in oxygen consumption.

Method of Procedure:

Phase 1: Using some such apparatus as the Seholander-Edwards respirometer, determine  $O_2$  consumption and  $O_{10}$ 's for various temperatures at various seasons.

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			
	<u>FY 1959</u>	<u>FY 1960</u>	<u>FY 1961</u>
Personal Services	---	---	2.5
Other Expenses:			
Within Project	---	---	2.5
Lab. Adm. & Ser.	---	---	8.6
Lab. Total	---	---	13.6
Regional Office			.136
Washington Office			
Total			

Recommended Source of Funds \_\_\_\_\_  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY; Phase 3 FY; Project FY 63.

Recommended by:

Originator	<u>R. L. Edwards</u>	Date	<u>8/6/59</u>
Investigation Chief	<u>R. L. Edwards</u>		<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>		<u>8/6/59</u>
Regional Director	<u>Joseph G. Demme</u>		<u>8/19/59</u>
Branch Chief	_____		

Approved by:  
Division Chief for Director \_\_\_\_\_

Remarks

(Continue on reverse side)

*Suggest these studies be delayed, except those parts which can be carried out as part of species investigations.*

U. S. Fish and Wildlife Service  
Bureau of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass.  
Date: August 6, 1959  
File No.

Research Project Outline

Title of Project: O<sub>2</sub> Consumption changes with changes in Mass

Investigation Title: Physiology

Investigation Chief: R. L. Edwards

Project Leader: Vacant

Name	Title	Grade
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Assistants: (Title and Grade)

Collaborators:

Need for Information: O<sub>2</sub> requirements decrease per unit of volume as an organism increases its mass. The nature of such a decrease, once carefully documented, will make possible a better understanding of the nature of growth.

Objective: To determine the change in metabolic rates as fish increase their size.

Method of Procedure:

Phase 1: Using respirometers, determine the O<sub>2</sub> consumption and the O<sub>10</sub> of a wide variety of sizes of various similarly acclimated species of fishes.

Phase 2:

Physiol - 2

Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs:	Total Needed by Laboratory for Complete Project		
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	<u>  --  </u>	<u>  --  </u>	<u>  2.5  </u>
Other Expenses:			
Within Project	<u>  --  </u>	<u>  --  </u>	<u>  2.5  </u>
Lab. Adm. & Ser.	<u>  --  </u>	<u>  --  </u>	<u>  8.7  </u>
Lab. Total	<u>  --  </u>	<u>  --  </u>	<u> 13.7  </u>
Regional Office			<u>  .137  </u>
Washington Office			
Total			

Recommended Source of Funds \_\_\_\_\_  
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY; Phase 3 FY; Project FY63

Recommended by:

Originator	<u>R. L. Edwards</u>	Date	<u>8/6/59</u>
Investigation Chief	<u>R. L. Edwards</u>		<u>8/6/59</u>
Laboratory Director	<u>Herbert W. Graham</u>		<u>8/ 6/59</u>
Regional Director	<u>Joseph F. Pomeroy</u>		<u>8/19/59</u>
Branch Chief	_____		

Approved by:  
Division Chief for Director \_\_\_\_\_

Remarks

(Continue on reverse side)

*Suggest study be delayed, except those parts which can be carried out as part of special investigations. JHE 12-24-59*

#715 7/9/59