

SCUP AND OTHER MIDDLE ATLANTIC SPECIES INVESTIGATIONS

There are a large number of fishes in the Middle Atlantic area that support minor fisheries and contribute largely to general fisheries. These fishes include the scup, butterfish, tilefish, sea bass, tautog, and many others. These fishes, individually, do not justify the status of a separate investigation. However, this laboratory must advance our knowledge of these species and keep up-to-date records on their relative abundance, changes in distribution and interactions with other species of special interest.

An initial goal of this is to determine the salient life history facts of each of these species and to develop the proper age reading techniques.

August 6, 1959

SUMMARY COST SCHEDULE

Investigation: Scup, et al
 Biological Laboratory: Woods Hole, Mass.

Project Title	Est. * Cost	Fiscal Years									
		57	58	59	60	61	62	63	64	65	66
1. Age and growth problems	26.0	17.3	3.4	0.8	1.4	3.1	--	--	--	--	--
2. Migrations of various scup stocks	125.2	--	16.4	16.4	16.4	16.9	16.0	12.0	10.2	9.4	11.5
3. Validation of scup aging methods	2.2	--	--	0.8	1.4	--	--	--	--	--	--
4. Validation of butterfish aging methods	2.2	--	--	0.8	1.4	--	--	--	--	--	--
5. Validation of tilefish aging methods	3.8	--	--	0.8	1.4	1.6	--	--	--	--	--
6. Feeding cycle of fishes	4.0	--	--	1.0	1.4	1.6	--	--	--	--	--
7. Age and growth of scup of southern New England	10.8	--	--	--	--	2.7	2.7	5.4	--	--	--
8. Age and growth of southern New England butterfish	10.3	--	--	--	--	2.7	2.6	5.0	--	--	--
9. Age and growth of tilefish	8.7	--	--	--	--	1.0	2.7	5.0	--	--	--
10. Skate aging techniques	15.5	--	--	--	--	1.6	2.6	5.0	6.3	--	--
11. Tilefish fecundity, spawning and young	22.8	--	--	--	--	--	2.6	6.7	7.0	6.5	--
12. Ecol. rel. of big and little skates	28.8	--	--	--	--	--	2.8	5.0	5.3	6.5	9.2
13. Tilefish feeding habits	22.3	--	--	--	--	--	--	--	5.3	7.8	9.2
14. Age and growth of skates	21.5	--	--	--	--	--	--	--	5.3	7.7	8.5
15. Age and growth of sea robins	20.2	--	--	--	--	--	--	--	5.2	7.5	7.5
Investigation Total	324.3	17.3	19.8	20.6	23.4	31.2	32.0	44.1	44.6	45.4	45.9
Annual Review			Date								
Laboratory	Regional or Area Office	Washington Office	Prepared by: Robert L. Edwards	8/6/59							
			Recommended by:	Date							
			Lab. Director Herbert W. Graham	8/6/59							
			Reg. or Area Dir. <i>Joseph F. Pinocchio</i>								
			Branch Chief <i>HKE 12/24/59</i>								
			Approved by:	Division Chief for Director							

*Total needed by Laboratory for Project in thousands of dollars.

#714 7/9/59

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: Age and growth problems

Investigation Title: Mid-Atlantic groundfish, scup et al

Investigation Chief: Invest. not yet activated

Project Leader:	<u>R. L. Edwards</u>	<u>F. R. B.</u>	<u>GS-12</u>
	Name	Title	Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: This is research on possible new techniques for the evaluation of growth, designed to improve our knowledge about growth rates and environmental factors that are involved in changing or modifying growth.

Objective: To improve techniques of growth analysis.

Method of Procedure:

Phase 1: Development of mathematical model based on new thoughts about growth.

to be done by the Fisheries Department
Aug 14

Phase 2:

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>0.5</u>	<u>0.5</u>	<u>2.0</u>
Other Expenses:			
Within Project	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>
Lab. Adm. & Ser.	<u>0.2</u>	<u>0.3</u>	<u>1.0</u>
Lab. Total	<u>0.8</u>	<u>1.4</u>	<u>3.1</u>
Regional Office	<u>.008</u>	<u>.014</u>	<u>.031</u>
Washington Office			
Total			

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

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

Recommended by:	Date
Originator <u>R. L. Edwards</u>	<u>8/6/59</u>
Investigation Chief <u>R. L. Edwards</u>	<u>8/6/59</u>
Laboratory Director <u>Herbert H. Graham</u>	<u>8/6/59</u>
Regional Director <u>Joseph F. Dunnehan</u>	<u>8/19/59</u>
Branch Chief <u>WHE.</u>	<u>12-24-59</u>
Approved by:	
Division Chief for Director <u>[Signature]</u>	<u>1-2-60</u>

Remarks

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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: Migrations of various scup stocks

Investigation Title: Scup and other Mid-Atlantic groundfish

Investigation Chief: Edwards (thru Industrial) Invest. not yet activated

Project Leader:	<u>L. M. Lawday</u>	<u>F. A.</u>	<u>GS-5</u>
	Name	Title	Grade

Assistants: (Title and Grade)

R. R. Stoddard, Statistical Clerk, GS-5 (part-time)

Collaborators:

Paul E. Hamer, N. J. Dept. of Conservation

Dr. A. Perlmutter, N. Y. State Dept. of Conservation

Need for Information: The scup has played an ever-increasing role in groundfish landings from the middle Atlantic area since the expansion of the winter trawl fishery. It is apparently made up of at least 3 distinct stocks. Any management possibilities must be based on an adequate understanding of the total population and its units.

Objective: To define migratory patterns of scup as they relate to possibly separate stocks and to hydrographic conditions.

Method of Procedure:

Phase 1: Tagging of fish off N. J. (Hamer), in Long Island Sound (Perlmutter), off Pt. Judith (FWS), off Newport (FWS) and off Woods Hole (FWS).

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			125.2
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	1.0	1.0	4.9
Other Expenses:			
Within Project	0.4	1.0	2.0
Lab. Adm. & Ser.	15.0	14.4	10.0
Lab. Total	16.4	16.4	16.9
Regional Office	.164	.164	.169
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58; Phase 2 FY; Phase 3 FY; Project FY 66

Recommended by:		<u>Date</u>
Originator	<u>R. L. Edwards</u>	<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. Pinner</u>	<u>8/19/59</u>
Branch Chief	<u>RHE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>JHE</u>	<u>1-2 60</u>

Remarks

(Continue on reverse side)

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: Evaluation of scup aging techniques

Investigation Title: Scup, et al (presently part of Industrial)

Investigation Chief: R. L. Edwards

Project Leader:	L. M. Lawday	F. A.	GS-5
	R. R. Stoddard	Stat. Clerk	GS-5
	None	Title	Grade

Assistants: (Title and Grade)

William Odum (summer volunteer)

Collaborators:

Paul E. Hamer, N. J. Dept. of Conservation

Need for Information: The determination of growth rates of various groups of scup is necessary prior to management evaluation. Growth rates are required for age composition analyzes, mortality computations and as possible indicators of stock differences. Techniques must be validated.

Objective: To determine best technique for ageing scup.

Method of Procedure:

Phase 1: Comparative study of fin rays, scales and otoliths to determine presence or absence of consistent annual marks.

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

	Estimated Costs: Total Needed by Laboratory for Complete Project <u>2.2</u>		
	<u>FY 1959</u>	<u>FY 1960</u>	<u>FY 1961</u>
Personal Services	<u>0.5</u>	<u>1.0</u>	<u>---</u>
Other Expenses:			
Within Project	<u>0.1</u>	<u>0.1</u>	<u>---</u>
Lab. Adm. & Ser.	<u>0.2</u>	<u>0.3</u>	<u>---</u>
Lab. Total	<u>0.8</u>	<u>1.4</u>	<u>---</u>
Regional Office	<u>.008</u>	<u>.014</u>	<u>---</u>
Washington Office	<u>---</u>	<u>---</u>	<u>---</u>
Total	<u>---</u>	<u>---</u>	<u>---</u>

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY; Phase 3 FY; Project FY 60

Recommended by:		Date
Originator	<u>R. L. Edwards</u>	<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 E. Penner</u>	<u>8/19/59</u>
Branch Chief	<u>HTE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>JWE</u>	<u>1-2-60</u>

Remarks

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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: Validation of butterfish ageing methods.

Investigation Title: Scup, et al.

Investigation Chief: R. L. Edwards (presently included in industrial)

Project Leader:	<u>R. L. Edwards</u>	<u>F. R. B.</u>	<u>GS-12</u>
	None	Title	Grade

Assistants: (Title and Grade)

L. M. Lawday F. A. GS-5

Collaborators:

Need for Information: To determine growth rates of butterfish.

Objective: To validate the use of the otolith as a tool for determining butterfish age.

Method of Procedure: Comparison of butterfish otolith ages with modal length frequency groups and their progression in time.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs:	Total Needed by Laboratory for Complete Project		
	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.5	---
Other Expenses:			
Within Project	0.1	0.1	---
Lab. Adm. & Ser.	0.2	0.8	---
Lab. Total	0.8	1.4	---
Regional Office	.008	.014	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY; Phase 3 FY; Project FY 60

Recommended by:	Date
Originator <u>R. L. Edwards</u>	<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 P. Omerchar</u>	<u>8/19/59</u>
Branch Chief <u>NHE</u>	<u>12-24-59</u>
Approved by:	
Division Chief for Director <u>NHE</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

*Question staff time available -
Is project complete?*

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: Validation of tilefish ageing techniques

Investigation Title: Scup, et al.

Investigation Chief: R. L. Edwards (project presently in industrial invest.)

Project Leader:	<u>L. M. Lawday</u>	<u>F. A.</u>	<u>GS-5</u>
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards F.R.B. GS-12

Collaborators:

Need for Information: The tilefish is highly dependant upon its environment and has suffered extreme mortalities apparently due to unusual cooling of the shelf waters. It supports a minor fishery and it is desired to know more about the life history of this fish.

Objective: To be able to satisfactorily determine growth rates of tilefish.

Method of Procedure: Otoliths, fin rays and scales all offer possibilities for satisfactory ageing. They must be compared, one with the other, to determine which is most satisfactory, and then proper validation studies prepared for publication.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			<u>3.8</u>
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	<u>0.4</u>	<u>0.5</u>	<u>0.5</u>
Other Expenses:			
Within Project	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>
Lab. Adm. & Ser.	<u>0.3</u>	<u>0.3</u>	<u>1.0</u>
Lab. Total	<u>0.8</u>	<u>1.4</u>	<u>1.6</u>
Regional Office	<u>.008</u>	<u>.014</u>	<u>.016</u>
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY59; Phase 2 FY; Phase 3 FY; Project FY 61

Recommended by:	Date
Originator <u>R. L. Edwards</u>	<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. Penner</u>	<u>8/19/59</u>
Branch Chief <u>WHE</u>	<u>12-24-59</u>
Approved by:	
Division Chief for Director <u>[Signature]</u>	<u>[Signature]</u>

Remarks

(Continue on reverse side)

Is staff time available?

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: Feeding cycle of fishes

Investigation Title: Scup, et al. (presently part of industrial)

Investigation Chief: R. L. Edwards

Project Leader:	<u>R. L. Edwards</u>	<u>F. R. B.</u>	<u>GS-12</u>
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Fritz	F. R. B.	GS-9
L. M. Lawday	F. A.	GS-5

Collaborators:

Need for Information: Some of the species of food fishes involved in southern New England's ground fishery vary markedly in availability throughout the day and throughout the tidal cycle. Preliminary studies indicated that this change in availability was due to periodic feeding habits, associated with the tides and/or change in day light.

Objective: To determine what feeding cycles exist in the local groundfishes.

Method of Procedure: Intensive collection of materials (stomachs) over at least a 36-hour period in an area where tidal currents are well known. Repeat collections needed to verify tidal influence, and to separate tidal effects from daylight influence.

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project		<u>4.0</u>		
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>	
Personal Services	<u>0.5</u>	<u>0.6</u>	<u>0.5</u>	
Other Expenses:				
Within Project	<u>0.2</u>	<u>0.1</u>	<u>0.1</u>	
	<u>---</u>	<u>---</u>	<u>---</u>	
Lab. Adm. & Ser.	<u>0.3</u>	<u>0.7</u>	<u>1.0</u>	
Lab. Total	<u>1.0</u>	<u>1.4</u>	<u>1.6</u>	
Regional Office	<u>.01</u>	<u>.014</u>	<u>.016</u>	
Washington Office	<u>---</u>	<u>---</u>	<u>---</u>	
Total	<u>---</u>	<u>---</u>	<u>---</u>	

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:		Date
Originator	<u>R. L. Edwards</u>	<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. Penner</u>	<u>8/19/59</u>
Branch Chief	<u>WHE</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>WHE</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

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: Age and growth of scup of southern New England

Investigation Title: Scup et al.

Investigation Chief: R. L. Edwards (Presently proj. part of industrial)

Project Leader:	L. M. Lawday	FA	GS-5
	R. R. Stoddard	Stat. Clerk	GS-5
	None	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards F.R.B. GS-12

Collaborators:

Need for Information: Age and growth data needed to analyze effects of fishing on population, to determine age composition and mortality rates.

Objective: To document the age and growth of scup and the variations observed.

Method of Procedure: Standard, back calculations, etc.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs:	Total Needed by Laboratory for Complete Project		
	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
Lab. Adm. & Ser.	---	---	1.5
Lab. Total	---	---	2.7
Regional Office			.027
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:		Date
Originator	<u>R. L. Edwards</u>	<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. Penner</u>	<u>8/19/59</u>
Branch Chief	<u>NHE.</u>	<u>12-24-59</u>
Approved by:		
Division Chief for Director	<u>[Signature]</u>	<u>1-2-60</u>

Remarks

(Continue on reverse side)

Question: Staff time available?

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: Age and growth of southern New England butterfish

Investigation Title: Scup, et al. (Proj. is part of industrial at present)

Investigation Chief: R. L. Edwards

Project Leader:	<u>R. L. Edwards</u>	<u>F. R. B.</u>	<u>GS-12</u>
	Name	Title	Grade

Assistants: (Title and Grade)

L. M. Lawday F. A. GS-5

Collaborators:

Need for Information: Southern New England's butterfish appears to be an essentially unexploited group of fish. Preliminary work indicates that largest market category is made up of 3 or 4 year old fish. Age and growth data will enable an evaluation of effect of fishery on this species.

Objective: To document the growth rate and its variations in southern New England butterfish.

Method of Procedure: Standard. Otolith readings, and possibly back calculations using otoliths. A short research report is planned.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project			10.3
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
Lab. Adm. & Ser.	---	---	1.5
Lab. Total	---	---	2.7
Regional Office			.027
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:		Date
Originator	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	<i>Joseph F. P...</i>	8/19/59
Branch Chief	<i>JHE</i>	12-24-59
Approved by:		
Division Chief for Director	<i>JHE</i>	1-2-60

Remarks

(Continue on reverse side)

Question: staff time available?

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: Age and growth of tilefish

Investigation Title: Scup and other middle Atlantic groundfish

Investigation Chief: R. L. Edwards (presently part of Industrial Invest.)

Project Leader:	<u>L. M. Lawday</u>	<u>F. A.</u>	<u>GS-5</u>
	Name	Title	Grade

Assistants: (Title and Grade)

R. R. Stoddard, Statistical Clerk, GS-5

R. L. Edwards, Fishery Research Biologist, GS-12

Collaborators:

Need for Information: The age composition of tilefish populations needs to be determined so that the Laboratory will be in a position management procedures if necessary.

Objective: To determine growth rates and their variations.

Method of Procedure:

Phase 1: Following validation, use best technique to age fish. Some research vessel cruises are required to collect material.

Phase 2: Start in 1961.

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project	8.7		
	FY 1959	FY 1960	FY 1961
Personal Services	---	---	0.5
Other Expenses:			
Within Project	---	---	0.2
Lab. Adm. & Ser.	---	---	0.3
Lab. Total	---	---	1.0
Regional Office			.01
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 F. Punercher</u>		<u>8/19/59</u>
Branch Chief			
Approved by:			
Division Chief for Director	<u>MEH</u>		<u>1-2 60</u>

Remarks

(Continue on reverse side)

*Is staff time available?
 NHE.*

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: Skate aging techniques

Investigation Title: Scup (et al) presently part of Industrial

Investigation Chief: R. L. Edwards

Project Leader: Vacant

Name	Title	Grade
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Assistants: (Title and Grade)

L. M. Lawday, Fishery Aide, GS-5

Collaborators:

Need for Information: Skates constitute a small but significant percentage of the industrial landings. Their loss to the fishery would be only slightly felt, however, little is known about the life history of this species and age-growth data for skates is required before any intelligent management procedures may be devised.

Objective: To enable the determination of growth rates of various species of skates.

Method of Procedure:

Phase 1: A study of fin spines, etc., and vertebral faces to determine whether or not it is feasible to age these fish. The Japanese have successfully used histological techniques (sections of the vertebrae) to age skates.

Phase 2:

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	---	---	0.5
Other Expenses:			
Within Project	---	---	0.1
Lab. Adm. & Ser.	---	---	1.0
Lab. Total	---	---	1.6
Regional Office			.016
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 64

Recommended by:		Date
Originator	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	<i>Joseph F. Pinescha</i>	8/19/59
Branch Chief		
Approved by:		
Division Chief for Director		

Remarks

(Continue on reverse side)

*Is staff time available?
 HHS.
 JWH*