LONG-RANGE PROGRAM

Biological Laboratory
Woods Hole, Mass.

Submitted August 12, 1959

Woods Hole Biological Laboratory

Check List of Budgetary Items for Fiscal 1960 and Following Years

Unit Scientific Investigations	Budget 1960	Budget 1961	Budget 1962
0. Surveys	--	44.3	96.4
1. Haddock	80.8	83.4	92.6
2. Cod	30.9	36.7	40.1
3. Redfish	58.7	74.9	78.9
4. Pollock, etc.	--	23.8	26.6
5. Hake	29.6	40.2	51.4
6. Scup, et al.	23.4	31.2	32.0
7. Industrial Fishery	48.2	50.6	57.8
8. Flounder	27.8	28.1	36.5
9. Dogfish, etc.	--	20.5	27.1
10. Diseases and Parasites	--	--	44.4
11. Serology	--	31.3	34.2
12. Experimental Studies (Aquarium)	27.5	29.8	32.7
13. Dynamics of Fish Populations	14.1	30.6	32.7
14. Estuarine Studies	--	--	--
15. Genetics Studies	--	--	28.9
16. Physiology	--	27.3	32.5
17. Fish Behavior	22.9	24.1	27.8
18. Sea Scallops[1/]	89.6	101.9	112.4
19. Oysters	17.5	26.0	--
20. Benthos	49.5	56.4	63.0
21. Plankton	69.0	69.7	79.6
22. Pelagic Fish	--	23.6	29.5
Total[2/]	589.5	854.4	1057.1

Unit	Budget 1960	Budget 1961	Budget 1962
Technical Services			
23. Port Pool	65.0	72.1	78.3
24. Fish Tag Service	5.9	6.0	6.3
25. Age Reading	--	15.4	14.9
26. Mechanical Data Processing	3.0	24.5	18.5
27. Drafting	6.1	9.3	8.2
28. Photography	6.9	7.6	9.3
29. Library	5.8	6.3	6.4
30. Scientific Report Typing	8.2	9.9	10.0
31. Instrumentation	6.5	15.0	17.8
32. Marine Technicians	8.6	8.8	16.8
33. Commission Activities	9.6	10.3	10.2
34. Vessel Operations	110.0	120.0	280.0
Total	235.6	305.2	476.7
Educational Services			
35. Student Assistants	5.0	10.0	10.0
36. ~~Public Relations~~ to Exp. Studies	.6	.6	.7
37. ~~Aquarium and Exhibits~~	6.2	31.8	20.8
Total	11.8	42.4	31.5
Administrative Services			
38. Administrative Offices	25.1	25.7	26.3
39. Other Administrative Office Services	48.4	50.6	51.4
40. Maintenance of Station	52.2	73.1	72.6
41. Contingency Fund	--	5.0	5.0
Total	125.7	154.4	155.3
	373.1	502.0	633.5

1/Includes prorated share of vessel operations as well as cost of charter of scallop vessels.

2/Includes prorated costs of all services

August 6, 1959

For administrative purposes the budgetary units of the Laboratory are classified into four main categories: Scientific Investigations, Technical Services, Educational Services, and Administrative Services.

The scientific investigations include all the projects concerned with scientific problems. The work in these projects includes design of the procedures, collection of data, analysis of data, and preparation of a report.

In some cases, when a project is prolonged, the collection of the data becomes routine. In this case, it is taken out of the scientific investigations and placed under technical services. The ~~routine~~ preliminary computations of the raw data also become routine in some instances and ~~is~~ are transferred to a unit in technical services. Even the reading of scales or otoliths becomes routine after the methods have been validated and precisely described. We expect to assign this to technical services, also, at least on a trial basis. Numerous other projects have to do with serving two or more scientific investigations by supplying technical services.

The category of educational services was set up to cover expenses relative to the aquarium which is open to the public in summer and to include various other expenses that rightly be charged to public relations.

Administrative services as classified here include the costs of the Director's and Administrative Assistant's offices, the strictly administrative clerks, and the maintenance of buildings, grounds, and docks.

SURVEYS INVESTIGATION

The most valuable information that a fishery research laboratory can have is a consistent body of data that may be used to evaluate secular changes in abundance, composition and distribution of the various species involved in any particular area. Analyses of catch statistics offers some crude estimates of these data but are all too frequently biased by poor areal coverage, selection of species and size of fish to be landed. Catch statistics do not supply any other data, such as that on hydrographic conditions, abundance of food and so forth.

With the acquisition of a new vessel, it is proposed that the laboratory set up a series of survey cruises, to be carried out periodically, for a number of years. The proposed surveys include the following:

1. Groundfish survey, quarterly
2. Hydrographic survey (in conjunction with #3), quarterly or twice a year depending upon specific needs of the Laboratory when new vessel is at hand
3. Plankton survey, as 2, above
4. Bottom community survey, quarterly and
5. Pelagic fish survey, no schedule as yet.

Each of these surveys is to be so designed and managed that the raw data will be prepared for publication prior to each succeeding cruise. Likewise, each survey will be modified slightly, if necessary, to provide specific information for various continuing investigations.

Specific descriptions of the proposed surveys follow:

1. Groundfish Survey

Not enough is known about the distribution and abundance of the major commercial groundfish species. Far less is known about species of minor commercial importance, and knowledge of species exploited lightly or not at all is extremely scant. Without expanded knowledge of abundance and distribution of commercial and potential commercial species and their ecological associates, efficient exploitation and management cannot be effected. For these reasons it is desired to initiate and maintain a routine groundfish survey.

The objective of the survey is to measure the abundance and distribution of the demersal fish populations of the Gulf of Maine, Georges Bank and adjacent areas, to evaluate fluctuations and changes in abundance, and to relate these where possible to seasonal and long-term variation in hydrographic conditions.

The first phase of the investigation is to be the assessment of previous surveys and the development of the most efficient means of measuring abundance and distribution, whether by geometric grids of stations, random grids, transects, or by some other method. When this phase is completed and a research vessel is available (probably FY 1962), a regular series of quarterly cruises will be carried out for a minimum period of five years. Each cruise will involve trawling operations and collection of sufficient hydrographic

and meteorological information to relate the collected information on distribution and abundance to environmental conditions. When a sufficient number of cruises have been made and sufficient data have been collected, probably after about three years, a rigorous evaluation of methods and procedure will be carried out and procedures modified appropriately.

2. Hydrographic Survey

Hydrographic surveys provide the primary information about the physical environment of marine animals. Commercial and non-commercial species of fish flourish in proper physical conditions, most important of which are perhaps temperature and salinity. Unsuitable physical conditions can cause reductions in numbers and in growth rate, and, at the extreme, death. In addition, chemical factors, primarily qualitative and quantitative variations in dissolved nutrients, drastically affect the phytoplankton populations, the basis of the food pyramid. For these reasons it is necessary that the hydrography of the area under study be well understood, not only for its own sake but because the area is one of the richest in the world in living marine resources, and comparison with other less rich areas will reveal just which are the most important hydrographic factors contributing to its abundance.

The objective of this survey is to learn as much as possible about the hydrography of the area and to integrate this information with data collected by other survey investigations and with investigations in other groups.

3. Plankton Survey

The organisms of the plankton provide the essential link between the potential production of the area and its actual production. In addition, many of the exploited and non-exploited animals spend more or less of their early lives as members of the plankton community. There is strong evidence that the year class strength of most of the commercial fishes is largely determined during their vulnerable planktonic phase.

The object of the plankton survey investigation is to learn as much as possible about the relation of the plankton organisms to their physical environment and to one another, in order to assess the productivity of the area and in order to predict (and even possibly control) the year class strengths of the commercially important species well in advance of their entering their respective fisheries as recruits. While a good deal is known about the plankton of the area, most of the information is essentially patchy and there is no continuous record of the plankton and its fluctuations for any substantial length of time.

The method of procedure will be to run quarterly surveys to assess both qualitatively and quantitatively the kinds and amounts of plankton present in the waters of the area.

4. Surveys of Bottom Communities

Bottom living invertebrate animals are the major source of food for the commercially valuable groundfish of the area. Thus they have an important bearing on the geographic occurrence, growth and

survival of the fish. Quantitative collections of these invertebrates are necessary to provide a basis for evaluating seasonal, regional and annual inventories of fish food supplies, particularly as they affect shifts in geographic occurrence and changes in growth rates and abundance of specific stocks of fish.

As a secondary purpose, these surveys will also provide the Woods Hole Laboratory with much-needed invertebrate specimens for life history studies of the invertebrates themselves--material of this sort is presently unavailable.

The basic method used will be quarterly surveys of the invertebrate bottom fauna of the area.

5. Pelagic Surveys

Pelagic fish, some of them migrating seasonally into New England waters, represent a commercial and recreational resource of unknown but potentially very large value. Except for herring, menhaden, mackerel, striped bass and some of the tunalike species, the pelagic fishes of the region are poorly documented. About 90 species of pelagic fish have been recorded from the Gulf of Maine, for example, and this does not include the groundfish, many of which are more or less pelagic at one time or another.

The recent discovery of commercial concentrations of tuna in waters bordering the continental shelf makes it even more important that we search out and evaluate the biological and commercial potential of the pelagic environment.

Since little is known about the fishes and of potential methods of capture, considerable exploratory work will have to be done, some of it probably in collaboration with other biological laboratories in the region and some with the Branch of Exploratory Fishing.

SURVEYS

List of Projects

1. Bottom Communities Survey
2. Pelagic Survey
3. Groundfish Survey
4. Hydrographic Survey
5. Plankton Survey

SUMMARY CONTT SCHEDULE

Investigation:
Biological Laboratory:

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Bottom Community Survey	87.0						1.5	22.0	20.5	21.5	21.5
Investigation Total	87.0	-	-	-	-	-	1.5	22.0	20.5	21.5	21.5

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert L. Graham — 8/6/59

Reg. or Area Dir. Joseph A. Munroe

Branch Chief

Approved by:

Division Chief for Director

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

Suggest survey investigation be combined with spawn investigations #714 7/9/59

SUMMARY CON[illegible]L SCHEDULE

Investigation:
Biological Laboratory:

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Pelagic Survey	76.4								24.4	26.5	27.5
Investigation Total	76.4	-	-	-	-	-	-	-	24.4	26.5	27.5

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham 8/6/59

Reg. or Area Dir. Joseph T. Penniket 1 AUG 1959

Branch Chief

Approved by:

Division Chief for Director

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

Suggest survey investigation McCormick with species investigations.

#714 7/9/59

SUMMARY CO[illegible]L SCHEDULE

Investigation:
Biological Laboratory:

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Groundfish Survey	71.8						8.0	15.9	15.9	16.0	16.0
Investigation Total	71.8	-	-	-	-	-	8.0	15.9	15.9	16.0	16.0

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — 8/6/59

Reg. or Area Dir. Joseph F. Dineen — 21 AUG 1959

Branch Chief [illegible] — AUG 12- 20-59

Approved by: [illegible]
Division Chief for Director

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

Suggest survey investigation be combined with species investigations. #714 7/9/59

SUMMARY CO[illegible]L SCHEDULE

Investigation:
Biological Laboratory:

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Hydrographic Survey	76.6					7.0	7.6	15.8	15.0	15.4	15.8
Investigation Total	76.6	-	-	-	-	7.0	7.6	15.8	15.0	15.4	15.8

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 6 AUG 1959

Reg. or Area Dir. [signature] — Date 21 AUG 1959

Branch Chief

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: Hydrographic Survey, preliminary studies

Investigation Title: Surveys

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To review previous studies, analyze present data and develop operational procedure for future routine surveys.

Objective: To plan hydrographic surveys.

Method of Procedure:

Phase 1:

Phase 2:

Hydrographic Survey
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 76.6

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	6.0
Other Expenses:			
Within Project	---	---	1.0
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	7.0
Regional Office			.07
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	Vacant	~~8/6/59~~
Investigation Chief	Vacant	
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 7/9/59

SUMMARY CO. .OL SCHEDULE

Investigation:
Biological Laboratory:

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Plankton Survey	157.5					2.7	19.9	34.1	33.0	33.6	34.2
Investigation Total	157.5	-	-	-	-	2.7	19.9	34.1	33.0	33.6	34.2

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir. [signature] — 1 AUG 1959

Branch Chief

Approved by:

Division Chief for Director

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

Suggest survey investigations be combined with specific investigations

#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: Plankton Survey, preliminary planning

Investigation Title: Survey

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To provide necessary information about needs of various laboratory investigations for information concerning plankton and to prepare a properly integrated plan for the plankton survey.

Objective: To present plan of operations for the plankton survey.

Method of Procedure:

Phase 1:

Phase 2:

Plankton Survey
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 157.5

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	1.2
Other Expenses: Within Project	--	--	1.5
Lab. Adm. & Ser.	--	--	--
Lab. Total	--	--	2.7
Regional Office			.027
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	**Vacant**	
Investigation Chief	**Vacant**	
Laboratory Director	**Herbert W. Graham**	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief		

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

#715 7/9/59

HADDOCK INVESTIGATIONS

The haddock has been the mainstay of New England's groundfish industry for many years. It is the most valuable food fish taken in offshore American waters. As such, changes in its abundance profoundly affect the well-being of the entire New England fishing industry.

While continued research is necessary to evaluate the effects of the present mesh regulation, and to formulate and to improve upon management regulations, the time has come to focus research attention upon the biology of this species. In the recent past, the emphasis has been on the effects of fishing as it shed light on the mesh regulation. The limitations of personnel and financing have prevented any significant research in the fields of ecology and biology to the extent that any further advances in management methods must await more sophisticated biological knowledge of the species.

The regulations presently in operation are concerned solely with conserving to man's best advantage whatever may be available from year to year, and do not answer the basic questions concerned with the reason for both long and short term changes in the abundance of this species. Pending much improved knowledge of the causes of these marked variations in abundance that have occurred, we shall be in no position either to predict, explain or control such changes. It is to this end that the haddock investigation presently shifts its research emphasis.

August 6, 1959

SUMMARY C[illegible]TROL SCHEDULE

Investigation: Haddock
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Validation of tagging techniques	25.7	6.3	6.4	6.4	6.6	---	---	---	---	---	---
2. Comparative age and growth studies of haddock	33.8	6.6	6.7	6.7	6.8	7.0	---	---	---	---	---
3. Analysis of haddock tagging results	82.3	12.8	13.0	12.2	13.0	15.5	15.8	---	---	---	---
4. Definition of haddock stocks	23.6	---	---	---	5.0	6.0	7.0	5.6	---	---	---
5. Seasonal distribution and abundance of haddock	40.3	6.3	6.3	6.4	6.5	6.8	8.0	---	---	---	---
6. Highlands Ground haddock study	16.0	---	3.4	4.1	4.0	4.5	---	---	---	---	---
7. Seasonal variation of haddock liver and gonad weights	19.2	---	6.3	6.4	6.5	---	---	---	---	---	---
8. Prediction of trends	95.7	8.6	8.6	7.4	7.5	7.6	9.0	7.0	11.0	14.5	14.5
9. Collection of biological samples	120.7	9.9	9.9	8.4	9.0	10.0	12.0	11.0	14.0	18.0	18.5
10. Fecundity of Haddock	36.0	---	---	---	---	12.0	12.5	11.5	---	---	---
11. Validation of stock analysis (serology)	36.9	---	---	---	---	---	10.0	11.5	15.4	---	---
12. Factors effecting successful recruitment (physical)	61.8	---	---	---	---	---	10.0	9.5	11.4	15.4	15.5
13. Factors effecting successful recruitment (biological)	58.1	---	---	---	---	---	8.3	7.5	11.4	15.4	15.5
14. Routine Age Reading	23.2	6.3	6.4	5.4	5.1	---	---	---	---	---	---
15. Prerecruit Survey (Annual)	16.6	---	---	6.0	4.6	6.0	---	---	---	---	
16. Biostatistics	35.2	9.8	7.0	4.2	6.2	8.0	---	---	---	---	
Investigation Total	725.1	66.6	74.0	73.6	80.8	83.4	92.6	63.6	63.2	63.3	64.0

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: J. Clark — Date 8/6/59

Recommended by: — Date

Lab. Director: Herbert W. Graham 8/6/59

Reg. or Area Dir.: Joseph A. Munroe 8/19/59

Branch Chief: [illegible] 12-24-59

Approved by: [illegible]

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: Validation of haddock aging techniques

Investigation Title: Haddock

Investigation Chief: John R. Clark

Project Leader: A. C. Jensen (Name) Fishery Research Biologist (Title) GS-9 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: The entire haddock management program is based on our estimates of growth rates and the changes in the age composition of the haddock population. A validated method of aging is needed.

Objective: To be able to specify, quantitatively if possible, the precision of the haddock aging methods.

Method of Procedure:

Phase 1: Comparison of scale readings with length frequency model groups, etc.

Phase 2:

HADDOCK - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 25.7

	FY 59	FY 60	FY 61
Personal Services	1.8	1.0	--
Other Expenses: Within Project	0.2	0.2	--
Lab. Adm. & Ser.	4.4	5.4	--
Lab. Total	6.4	6.6	--
Regional Office	.064	.066	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1960

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph L. Pennington	8/19/59
Branch Chief	[illegible]	12-24-59.

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Comparative age and growth studies of haddock

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: A. C. Jensen (Name) Fishery Research Biologist (Title) GS-9 (Grade)

Assistants: (Title and Grade)

J. P. McDermott - Fishery Research Biologist GS-5

Collaborators:

Need for Information: Age and growth information, its variation from area to area and seasonally, is required for intelligent management evaluation.

Objective: To specify the normal age-growth relations of various haddock stocks.

Method of Procedure:

Phase 1: Analysis of scale reading data.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.8

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.4	2.0
Other Expenses: Within Project	.5	.5	1.5
Lab. Adm. & Ser.	5.2	4.9	3.5
Lab. Total	6.7	6.8	7.0
Regional Office	.067	.068	.07
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1961

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Lunsford	8/20/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: ~~Analysis of haddock tagging results~~

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. R. Clark (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. C. Jensen	Fishery Research Biologist	GS-9
J. P. McDermott	Fishery Research Biologist	GS-5

Collaborators:

Need for Information: Tagging haddock enables the laboratory to make decisions about the separateness of various haddock populations and helps to understand the differential seasonal movements of various groups of haddock.

Objective: To ~~more clearly~~ define haddock "population units" and to determine seasonal movements.

Method of Procedure:

Phase 1: Tag haddock on research vessel. Analysis of return information.

Phase 2:

HADDOCK - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 82.3

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	2.0
Other Expenses: Within Project	1.5	0.5	0.5
Lab. Adm. & Ser.	9.7	11.5	13.0
Lab. Total	12.2	13.0	15.5
Regional Office	.122	.133	.155
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1962

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph J. Pinschewer	8/20/59
Branch Chief	[illegible]	12-24-59.

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Definition of haddock stocks

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. R. Clark (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. C. Jensen Fishery Research Biologist GS-9
J. P. McDermott Fishery Research Biologist GS-5

Collaborators:

Need for Information: The definition of haddock stocks is required to further our ability to make necessary management evaluations.

Objective: To define haddock "population units" in the Gulf of Maine and contiguous waters.

Method of Procedure:

Phase 1: Analysis of tag returns, vertebral counts, catch data, etc. with specific reference to defining "population units".

Phase 2:

HADDOCK - 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.6

	FY 1959	FY 1960	FY 1961
Personal Services	--	1.0	2.5
Other Expenses:			
Within Project	--	0.5	3.0
Lab. Adm. & Ser.	--	3.5	.5
Lab. Total	--	5.0	6.0
Regional Office		.05	.06
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1963

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph J. Pfeiffer	8/19/59
Branch Chief	Edward W. Fiegler	12-24-59.

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Seasonal distribution and abundance of haddock

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. R. Clark (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: The seasonal distribution and abundance of haddock has apparently undergone a considerable change in recent years. These changes are apparently associated with changes in environment. Data is needed to evaluate long-term environment changes with population changes.

Objective: To define the pattern of distribution and relative abundance.

Method of Procedure:

Phase 1: Analysis of catch records.

Phase 2:

HADDOCK - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 40.3

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	2.0	2.0
Other Expenses: Within Project	.2	0.3	0.5
Lab. Adm. & Ser.	5.2	4.2	4.3
Lab. Total	6.4	6.5	6.8
Regional Office	.064	.065	.068
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1962

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Penczkowski	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: A study of the Highland Ground haddock

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. R. Clark (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. C. Jensen	Fishery Research Biologist	GS-9
J. P. McDermott	Fishery Research Biologist	GS-5

Collaborators:

Need for Information: This study is being undertaken for the purpose of obtaining material on a regular basis on a fishing ground known as a particularly good year-round haddock area. The biological material is being analyzed for seasonal changes and for information that may indicate reasons for the seasonal activities of haddock.

Objective: To closely study one small area and its changing haddock population.

Method of Procedure:

Phase 1: Survey cruises with chartered vessel monthly.
Studies of various body organs and their seasonal changes.
Analysis of changes in species composition
Analysis of changes in organ (haddock) weights
Analysis of changes in haddock age and length composition

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 16.0

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	2.0	2.5
Other Expenses: Within Project	2.0	0.2	0.2
Lab. Adm. & Ser.	0.1	1.8	1.8
Lab. Total	4.1	4.0	4.5
Regional Office	.041	.04	.045
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	John R. Clark	8/6/59
Investigation Chief	J. R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pearce	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Seasonal variation of haddock liver and gonad weights

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. P. McDermott (Name) Fishery Research Biologist (Title) GS-5 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: Such analyses as these aid in the interpretation of seasonal movements, behavior, etc.

Objective: To determine and relate seasonal changes in body organs.

Method of Procedure:

Phase 1: Weights of various organs, monthly (charter cruises)
Analysis of changes reported by port pool.

Phase 2:

Haddock - 7

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 19.2

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	3.0	--
Other Expenses: Within Project	0.2	0.5	--
Lab. Adm. & Ser.	4.2	3.0	--
Lab. Total	6.4	6.5	--
Regional Office	.064	.065	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	J. R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Prediction of haddock trends

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. R. Clark (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. C. Jensen	Fishery Research Biologist	GS-9
J. P. McDermott	Fishery Research Biologist	GS-5

Collaborators:

Need for Information: Information for the Fishery to enable them to intelligently plan future operations.

Objective: To predict the haddock population structure for the benefit of the Fishery

Method of Procedure:

Phase 1: Analysis of biological information and landings data for indications of shifts in population strength and structure.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 95.7

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	2.0	2.5
Other Expenses: Within Project	0.2	0.2	0.5
Lab. Adm. & Ser.	5.2	5.3	4.6
Lab. Total	7.4	7.5	7.6
Regional Office	.074	.075	.076
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pierce	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Collection of biological samples

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: A. C. Jensen (Name) Fishery Research Biologist (Title) GS-9 (Grade)

Assistants: (Title and Grade)

J. P. McDermott - Fishery Research Biologist GS-5

Collaborators:

Need for Information: Biological samples are difficult to obtain through the commercial fishery since haddock are landed gutted. Special effort must be expended by chartering trips or purchasing special material.

Objective: To obtain required samples of biological material.

Method of Procedure:

Phase 1: Arrangements with fishermen and other cooperators to collect entire fish or other special material.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 120.7

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	2.0	1.5
Other Expenses: Within Project	0.3	0.3	0.3
Lab. Adm. & Ser.	6.1	6.7	8.2
Lab. Total	8.4	9.0	10.0
Regional Office	.084	.090	.10
Washington Office			
Total			

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

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

Recommended by:		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pineo	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	

Remarks

(Continue on reverse side)

#715 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: Fecundity of haddock

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: A. C. Jensen (Name) Fishery Research Biologist (Title) GS-9 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: The ability of the haddock to sustain its population is dependent in part on its fecundity. This project must evaluate the interrelations of spawning capacity and the environment of haddock eggs and larvae. For this evaluation, some estimate of spawning capacity is required.

Objective: To determine the fecundity of haddock as it relates to size, age, and stock.

Method of Procedure:

Phase 1: Obtain samples of haddock gonads for fecundity studies.

Phase 2: Determine number of eggs as function of age, size and area (stock).

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 36.0

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	1.0
Other Expenses: Within Project	--	--	
Lab. Adm. & Ser.	--	--	11.0
Lab. Total	--	--	12.0
Regional Office			.12
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Peterson	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Routine Age Reading

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: A. Jensen (Name) F. R. B. (Title) GS-9 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: Haddock landings are broken down into their age compositions to determine the contribution of various age classes to the yield and to estimate mortalities.

Objective: To determine age composition of haddock landings.

Method of Procedure: Obtain scale samples from the ports.
Read scales to determine age.

Phase 1: Perform routine back-calculations as required.

Phase 2:

Haddock-14

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.2

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	--
Other Expenses: Within Project	0.2	0.2	--
Lab. Adm. & Ser.	4.2	3.9	--
Lab. Total	5.4	5.1	--
Regional Office	.054	.051	
Washington Office			
Total			

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

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

Recommended by:		Date
Originator	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Poucher	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	

Remarks

(Continue on reverse side)

#715 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: Pre-recruit Survey

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: J. R. Clark, Fishery Research Biologist, GS-12
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Toward the end that the future of the haddock fishery may be forecast, a survey of the pre-recruit strength of haddock appears to provide the required information. This possibility needs to be investigated.

Objective: To determine the pre-recruit strength of haddock and to validate the use of such estimates as a tool in forecasting fishery conditions.

Method of Procedure:

Phase 1: Survey cruise, occupying a series of stations in the New England area.

Phase 2: Analysis of catch data for areal distribution and abundance. Comparison of data with that of past years and the success of the fishery that has followed years of pre-recruit survey.

Haddock - 15

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 16.6

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	3.0	3.0
Other Expenses:			
Within Project	3.8	1.1	2.5
Lab. Adm. & Ser.	0.2	0.5	0.5
Lab. Total	6.0	4.6	6.0
Regional Office	.06	.046	.06
Washington Office			
Total			

Recommended Source of Funds S&K and Regular
(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	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Dunnachie	8/19/59
Branch Chief	ZHE.	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: Biostatistics Report (Annual)

Investigation Title: Haddock

Investigation Chief: J. R. Clark

Project Leader: F. A. Dreyer, Statistical Clerk, GS-6
Name Title Grade

Assistants: (Title and Grade)

A. C. Jensen, Fishery Research Biologist, GS-9

Collaborators:

Need for Information: This report is a compilation of the vital statistics of the haddock fishery, prepared for the use of the industry and our international partners in ICNAF that are interested in evaluating the results of mesh regulation.

Objective: To put the biostatistics of the New England haddock population on record.

Method of Procedure:

Phase 1: Analysis and compilation of haddock landings data, age composition data, abundance data, and growth rate data.

Phase 2: Preparation of report (Annual).

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 35.2

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	3.0	3.0
Other Expenses: Within Project	0.5	0.5	0.5
Lab. Adm. & Ser.	0.7	2.7	4.5
Lab. Total	4.2	6.2	8.0
Regional Office	.042	.062	.08
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	John R. Clark	8/6/59
Investigation Chief	John R. Clark	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Passeretti	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-26-60

Remarks

(Continue on reverse side)

#715 7/9/59

COD INVESTIGATION

About thirty-five million pounds of cod are landed in the United States each year, with a total value of about two and one-quarter million dollars. These fish are taken with various gears, but mostly otter trawls. A considerable amount is taken by large otter trawlers based at Boston and engaged mainly in the haddock fishery. Besides being an important incidental catch for these vessels, the cod serves as a buffer in times of low haddock abundance.

There appears to be at the present time a marked increase in abundance of cod associated with a decrease in haddock. There is some indication that management of this fishery by the mesh regulation now in force is having beneficial effects in protecting the strong year classes entering the fishery.

The responsibility of the Woods Hole Biological Laboratory for cod research is broader, however, than local considerations imply. Because of its commitment to the International Commission for the Northwest Atlantic Fisheries (whose member nations take about two billion pounds of cod from the Convention Area each year), the United States is doing research in support of the Commission's program for maximum sustained yield from the Northwest Atlantic cod fishery. The Woods Hole Biological Laboratory is in a position to make unique contributions to cod biology, being situated as it is close to the fastest-growing and perhaps ; most widely fluctuating stocks of cod in the Atlantic. Studies of these stocks promise to yield much valuable information about the general biology and ecology of the species, which will be applicable to the whole ICNAF area.

August 6, 1959

SUMMARY C ROL SCHEDULE

Investigation: Cod
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Bibliography	29.0	8.0	8.0	8.0	5.0	-	-	-	-	-	-
2. Age and growth of Cod from Cape Sable to Hatteras	14.6	-	-	2.3	3.3	4.0	5.0	-	-	-	-
3. Migrations of cod in the area from Cape Sable to Cape Hatteras	58.5	8.0	9.5	8.0	5.0	5.0	5.0	9.0	9.0	-	-
4. Definition of cod stocks from Cape Sable to Cape Hatteras	66.8	8.0	8.5	6.0	5.3	6.0	6.0	8.0	9.0	10.0	-
5. Biology of Middle Atlantic Cod	66.7	8.0	9.4	6.0	4.3	6.0	6.0	8.0	9.0	10.0	-
6. Parasites of cod from Cape Sable to Cape Hatteras	81.1	7.7	9.4	6.0	4.0	6.0	6.0	9.0	9.0	10.0	14.0
7. Chromatography studies of cod tissues	61.0	-	-	6.0	4.0	4.0	5.0	9.0	9.0	10.0	14.0
8. Distribution of pre-recruit cod in the area fr Cape Sable to Cape Hatteras	55.2	-	-	-	-	5.7	7.1	9.2	9.2	10.0	14.0
9. Fluctuations in year class	29.1	-	-	-	-	-	-	-	5.1	10.0	14.0
10. Seasonal changes in abundance	23.8	-	-	-	-	-	-	-	-	8.8	15.0
Investigation Total	485.8	39.7	44.8	42.3	30.9	36.7	40.1	52.2	59.3	68.8	71.0

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: John P. Wise — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham 8/6/59

Reg. or Area Dir. Joseph A. Munroe

Branch Chief DATE. 12-24-59

Approved by: [illegible]
Division Chief for Director

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

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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: Cod Bibliography Project

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)
H. E. Murray, Statistical Clerk, GS-5

Collaborators:
Librarian, Marine Biological Laboratory, Woods Hole

Need for Information: There is a great deal of information in the scientific and technical literature of the world concerning the biology of the Atlantic cod, Gadus morhua L. Some of this is contained in the standard fishery journals, but a considerable body of data is scattered throughout other journals primarily concerned with embryology, biochemistry, etc. For the efficient prosecution of research on the cod it is necessary to seek out and to arrange this information in a systematic fashion.

Objective: To assemble an indexed bibliography to the literature of the cod.

Method of Procedure: Standard techniques of library search, including assessment of bibliographies contained in all available papers. Interlibrary loans where needed. Abstracting of all pertinent papers to punch cards, which are coded for author, date of publication, geographic area, and subjects.

Phase 1:

Phase 2:

Cod - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 29.0

	FY 1959	FY 1960	FY 1961
Personal Services	1.2	1.8	--
Other Expenses: Within Project	.1	.1	--
Lab. Adm. & Ser.	6.7	3.1	--
Lab. Total	8.0	5.0	--
Regional Office	.08	.05	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	HHE.	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-26-

Remarks

(Continue on reverse side)

#715 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 of Cod from Cape Sable to Cape Hatteras

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

H. E. Murray, Statistical Clerk, GS-5
Vacant, Fishery Research Biologist, GS-7 (commencing FY 1961)
Vacant, Student Assistant, GS-4 (FY 1958 and others as assigned)

Collaborators:

None

Need for Information: One of the primary population parameters needed for assessment and management of a fishery is the growth rate, together with information about variations in this growth rate from year to year, from season to season, and from place to place.

Objective: To assess the growth rate of the cod in the area of study and to measure variations in this rate.

Method of Procedure: Collection of hard parts of the cod (scales, otoliths, bones, etc.) and evaluation of these as indicators of annual growth.

Phase 1: Comparison of annual rings in the parts chosen with the measured growth of the animal from which they came. Back-calculation of previous growth if indicated. Calculation of growth from measurements of tagged and recaptured fish.

Phase 2:

Cod - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 14.6

	FY 1959	FY 1960	FY 1961
Personal Services	1.3	2.0	2.5
Other Expenses: Within Project	.1	.2	.3
Lab. Adm. & Ser.	.9	1.1	1.2
Lab. Total	2.3	3.3	4.0
Regional Office	.023	.033	.04
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:

		Date
Originator	**John P. Wise**	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Pomeroy	8/19/59
Branch Chief	H.H.E.	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2 6.

Remarks

(Continue on reverse side)

#715 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: Migrations of cod in the area from Cape Sable to Cape Hatteras

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

H. E. Murray, Statistical Clerk, GS-5
Vacant, Fishery Research Biologist, GS-7 (commencing FY 1961)

Collaborators:

None

Need for Information: The cod is known to be one of the more migratory of the demersal fishes of the area. Its migrations appear to be related to size, breeding condition, season of year, and other unknown factors. These migrations have strong effects on the identity of populations, availability to fishing gears, etc.

Objective: To assess and evaluate the migrations of cod in the area and to relate these movements where possible to the environment and biology of the fish.

Method of Procedure: Tagging of fish at strategically located areas. Collection and assessment of information about time and place of recapture.

Phase 1: Deductive reasoning from other information about morphometrics and meristics, abundance and distribution.

Phase 2:

Cod - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 58.5

	FY 1959	FY 1960	FY 1961
Personal Services	1.5	2.0	2.5
Other Expenses: Within Project	.3	.2	.3
Lab. Adm. & Ser.	6.2	2.8	2.2
Lab. Total	8.0	5.0	5.0
Regional Office	.08	.05	.05
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 64

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	UHE.	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Definition of cod stocks from Cape Sable to Cape Hatteras

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

H. E. Murray, Statistical Clerk, GS-5
Vacant, Fishery Research Biologist, GS-7 (commencing FY 1961)
Vacant, Student Assistant, GS-4 (FY 1957 and others as assigned)

Collaborators:

None

Need for Information: Assessment and management of a fished population requires that the stocks of fish comprising the population be identified in order that different growth rates, mortality rates, fecundities, etc., may be accounted for.

Objective: To determine the number of cod stocks in the area, their differential distribution and abundance, and the varying population parameters in the stocks.

Method of Procedure: Standard techniques of tagging in conjunction with migrations project. Collection of length-frequency data, morphometrics and

Phase 1: meristics; application of techniques of chromatography and serology as appropriate. Assessment and rigorous statistical testing of these data to determine the different stocks and their intermixture if any.

Phase 2:

Cod - 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 66.8

	FY 1959	FY 1960	FY 1961
Personal Services	1.8	3.0	2.0
Other Expenses: Within Project	.4	.4	.2
Lab. Adm. & Ser.	3.8	1.9	3.8
Lab. Total	6.0	5.3	6.0
Regional Office	.06	.053	.06
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY65

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: Biology of the Middle Atlantic Cod

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

H. E. Murray, Statistical Clerk, GS-5
Vacant, Fishery Research Biologist, GS-7 (commencing FY 1961)

Collaborators:

None

Need for Information: The Middle Atlantic cod inhabit mainly the New York and New Jersey coasts in winter, and the Southern New England area in summer, spending most of the other two seasons of the year in the transition. While this stock is not in itself important to the fishery, it is of marked biological interest since it represents the southernmost indigenous stock of a species distributed to the Arctic. A study of the biology of this stock should lead to considerable increase in information about the life history and ecology of the species generally, since in such an area the ecological "edge effects" may be studied and measured.

Objective: To learn as much as possible about the biology of the Middle Atlantic cod, particularly as they are related to their environment.

Method of Procedure: Standard methods of fishery biology, supplemented by special studies of the environment and relations of the environment to the fish.

Phase 1:

Phase 2:

Cod - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 66.7

	FY 1959	FY 1960	FY 1961
Personal Services	1.5	1.0	2.0
Other Expenses: Within Project	.2	.2	.2
Lab. Adm. & Ser.	4.3	3.1	3.8
Lab. Total	6.0	4.3	6.0
Regional Office	.06	.043	.06
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director		8/19/59
Branch Chief	Project should be re-examined & restricted in scope. HWG. 12-24-59.	

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Parasites of cod from Cape Sable to Cape Hatteras

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

H. E. Murray, Statistical Clerk, GS-5
Vacant, Student Assistant, GS-4 (FY 1958 and others as assigned)

Collaborators:

None

Need for Information: The parasites of cod are useful in furnishing information about the identity of stocks, particularly since previous investigation of one of these parasites in some detail has shown that the incidence of its occurrence is closely related to the different stocks of fish. In addition, there are some technological problems connected with cod parasites, particularly since some of the parasites render the fillets unmarketable, or at least less desirable commercially.

Objective: To assess the numbers and kinds of parasites to be found in and on cod in the area, and to relate this information where possible to the life history and biology of the fish.

Method of Procedure:

Phase 1: A general parasite inventory, with special studies of various specific parasites when these are indicated, using standard techniques of examination of market samples and specially collected samples.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 81.1

	FY 1959	FY 1960	FY 1961
Personal Services	1.2	1.0	2.0
Other Expenses: Within Project	.1	.1	.1
Lab. Adm. & Ser.	4.7	2.9	2.9
Lab. Total	6.0	4.0	6.0
Regional Office	.06	.04	.06
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Quinn [illegible]	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2 60

Remarks

(Continue on reverse side)

#715 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: Chromatography Studies of Cod Tissues

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)
H. E. Murray, Statistical Clerk, GS-5

Collaborators:
University Biochemistry Department and/or BCF chemists.

Need for Information: Preliminary explorations of techniques, primarily by European and West Coast workers, have shown that paper chromatography, principally of muscle tissue, can be used to identify groups of fishes. Some difficulties have been encountered, particularly with regard to state of preservation of the muscle tissues and with regard to seasonal variation in the metabolism of the subject. This technique would be particularly useful in the study of cod populations and would, if pursued far enough, yield information on the metabolism and biology of the cod itself.

Objective: To work out dependable techniques for the use of chromatographic methods in analysis of cod tissues so that stocks of fish can be identified and so that metabolic studies on individual fish can be conducted.

Method of Procedure: Experimentation in conjunction with chemically trained personnel to develop appropriate chromatographic methods and to

Phase 1: eliminate variables caused by state of preservation of fish and metabolic condition.

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 61.0

	FY 1959	FY 1960	FY 1961
Personal Services	1.3	1.0	2.0
Other Expenses:			
Within Project	.1	.1	.2
Lab. Adm. & Ser.	4.6	2.9	1.8
Lab. Total	6.0	4.0	4.0
Regional Office	.06	.04	.04
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-60

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: Distribution of prerecruit cod in the area from Cape Sable to Cape Hatteras

Investigation Title: Cod Investigation

Investigation Chief: John P. Wise

Project Leader: John P. Wise, Fishery Research Biologist, GS-11
(Name) (Title) (Grade)

Assistants: (Title and Grade)

H. E. Murray, Statistical Clerk, GS-5
Vacant, Fishery Research Biologist, GS-7
Vacant, Student Assistant, GS-4 (as assigned)

Collaborators:

None

Need for Information: Information is lacking about the distribution of cod from the time they leave the plankton shortly after hatching until they enter the fishery as recruits. This is probably a vitally important period in their life history, possibly the one in which the strength of each successive yearclass is determined. Some assessment of the relative numbers of juvenile fish during this stage would be extremely useful in prediction of the strength of the yearclass to enter the fishery a year or two later.

Objective: To locate the areas and ecological niches inhabited by the cod before they enter the fishery and to attempt to develop methods of quantitative estimates of numbers.

Method of Procedure:

Phase 1: A search, using mostly small chartered vessels, in areas likely to be occupied by juvenile cod, particularly along the rocky shores north of Boston.

Phase 2: Development of methods of quantitative sampling of these fish.

Cod - 8

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 55.2

	FY 1959	FY 1960	FY 1961
Personal Services			4.0
Other Expenses:			
Within Project			1.0
Lab. Adm. & Ser.			.7
Lab. Total			5.7
Regional Office			.057
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	John P. Wise	8/6/59
Investigation Chief	John P. Wise	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-7-60

Remarks

(Continue on reverse side)

#715 7/9/59

REDFISH INVESTIGATION

Redfish (or ocean perch) are being commercially exploited across a broad area of the North Atlantic Ocean by an increasing number of vessels representing six European nations, Canada and the United States. Knowledge of the biology of this species is necessary for understanding the causes of fluctuation in the fishery, and is needed for effectively managing this international resource.

Redfish is a deep water fish that differs from other commercial species in many important characteristics which cause special problems in biological studies. The species grows very slowly and, as a result, the stocks quickly decline in abundance when exploited. It has been difficult to study basic problems such as migration, schooling and spawning behavior and food habits because they cannot be taken alive from their normal deep-water habitat. The sensitivity of the fish to decompression is such that capture by net or hook-and-line is usually fatal.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: Redfish
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 of Redfish in the Gulf of Maine	33.0	14.3	9.7	9.0	--	--	--	--	--	--	--
2. Biostatistics of U. S. Redfish Landings	86.0	14.3	9.7	9.0	8.0	7.0	8.0	8.0	7.0	7.0	8.0
3. Redfish Spawning Studies	48.1	14.3	9.7	9.0	8.1	7.0	--	--	--	--	--
4. Migration and Growth Studies of Tagged Redfish at Eastport, Maine	47.2	14.3	8.7	9.0	8.1	7.1	--	--	--	--	--
5. Vertical Distribution of Pelagic Young Redfish	39.9	--	8.5	9.2	7.1	7.1	8.0	--	--	--	--
6. Racial Studies - Identification of Adult Sebastes in the North Atlantic Ocean	37.9	--	7.5	8.2	7.1	7.1	8.0	--	--	--	--
7. Incidence of the Copepod Ectoparasite Sphyrion Lumpi on Redfish in the Gulf of Maine	36.8	--	6.2	8.2	7.1	7.1	8.2	--	--	--	--
8. Comparison of Redfish Growth Rates Between Gulf of Maine and other North Atlantic Areas	38.6	--	--	8.2	7.1	7.1	8.2	8.0	--	--	--
9. Growth Rates of Redfish Stocks in the Gulf of Maine	36.4	--	--	--	6.1	7.1	8.2	8.0	7.0	--	--
10. Racial Studies - Identification of Sebastes Larvae	36.4	--	--	--	--	6.1	8.2	8.0	7.1	7.0	--
11. Migration Studies - Tagging Redfish in Deep Water	36.2	--	--	--	--	6.1	8.0	8.0	7.1	7.0	--

SUMMARY CON L SCHEDULE

Investig on: Redfish
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
12. Underwater TV Study of Redfish Behavior at Eastport, Me.	35.2	--	--	--	--	6.1	7.0	8.0	7.1	7.0	--
13. Definition of Redfish Stocks in the Gulf of Maine and Western Nova Scotia	36.3	--	--	--	--	--	7.1	8.0	7.1	7.0	7.1
14. Age Composition of Gulf of Maine Redfish Stocks	29.2	--	--	--	--	--	--	8.0	7.1	7.0	7.1
15. Drift of Redfish Larvae and Post Larvae in the Gulf of Maine and Western Nova Scotia	28.4	--	--	--	--	--	--	7.2	7.1	7.0	7.1
16. Planktonic Associations of Redfish Larvae and other Plankton Organisms	21.2	--	--	--	--	--	--	--	7.1	7.0	7.1
17. Experimental Growth Studies of Redfish Larvae	21.2	--	--	--	--	--	--	--	7.1	7.0	7.1
18. Experimental Studies of the Transmission of Vertebral Numbers in Young Redfish	20.6	--	--	--	--	--	--	--	7.1	7.0	6.5
19. Population Dynamics of Gulf of Maine Redfish Stocks	11.1	--	--	--	--	--	--	--	--	4.0	7.1
20. Life History of Sphyrion Lampi, Ectoparasite on Redfish	10.0	--	--	--	--	--	--	--	--	3.9	6.1
21. Effect of Sphyrion Lampi Attachment on Redfish	6.0	--	--	--	--	--	--	--	--	--	6.0
22. Age Composition of Nova Scotia, Grand Banks and Gulf of St. Lawrence Redfish Stocks	6.0	--	--	--	--	--	--	--	--	--	6.0
Investigation Total	701.7	57.2	60.0	69.8	58.7	74.9	78.9	71.2	77.9	77.9	75.2

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: George F. Kelly — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir. Joseph L. Pierce [illegible]

Branch Chief Edward H. Ehler 12-24-59

Approved by: [illegible] 1-2-60

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 of Redfish in the Gulf of Maine

Investigation Title: Redfish

Investigation Chief: George F. Kelly

Project Leader: George F. Kelly (Name) F.R.B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

Allan M. Barker F.R.B. GS-7
George M. Clarke Fishery Aid GS-7

Collaborators: None

Need for Information: The growth rate of redfish was needed as a basis for population dynamic studies to assess the potential production of the Gulf of Maine redfish stocks.

Objective: To validate the formation of year zones in redfish scales and otoliths and determine the average growth rate for the species in the Gulf of Maine using the otolith age reading technique.

Method of Procedure:

Phase 1: Sample young of the year redfish at a selected station throughout the year and record the seasonal changes in scales and otoliths.
Collect and examine larval and post-larval specimens to determine the age of the fish at time of first annulus formation in the scales and otoliths.

Phase 2: Estimate fish age from a large series of otoliths and draw a growth curve to the average length at each age.

Redfish 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.0

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	---	---
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	8.0	---	---
Lab. Total	9.0	---	---
Regional Office	.09		
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	G. F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director		8/14/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Biostatistics of U. S. redfish landings

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

G. M. Clarke, Fishery Aid, GS-7

Collaborators: None

Need for Information: Knowledge of the quantities of redfish landed from each area, the fishing effort expended and the sizes and sex ratio of the fish in the population are primary requirements in fishery studies.

Objective: To obtain an annual compilation of the biological statistics of the U. S. redfish fishery in all areas fished by U. S. vessels.

Method of Procedure: Compile the interview and sampling material collected at the three primary redfish ports, Gloucester, Mass., Portland and Rockland, Maine.

Phase 1:

Phase 2:

REDFISH - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 86.0

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	2.0	2.0
Other Expenses:			
Within Project	0.1	0.5	0.5
Lab. Adm. & Ser.	5.9	5.5	4.5
Lab. Total	9.0	8.0	7.0
Regional Office	.09	.08	.07
Washington Office			
Total			

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

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

Recommended by:		Date
Originator	G. F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph J. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	

Remarks

(Continue on reverse side)

#715 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: Redfish spawning studies

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)
G. M. Clarke, F. A., GS-7

Collaborators: None

Need for Information: It is important to know of variations in the time of breeding in fish stocks from different areas for use in studying the biology of the stocks and as a basis for management practices.

Objective: To determine the time of spawning, fecundity, size at maturity and other characteristics associated with the breeding cycle in each fishing area.

Method of Procedure: Observations of the gonad conditions of commercial fish samples from each area throughout the year.

Phase 1:

Phase 2:

REDFISH - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 48.1

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	2.7	2.5
Other Expenses: Within Project	2.0	2.4	3.0
Lab. Adm. & Ser.	4.0	3.0	1.5
Lab. Total	9.0	8.1	7.0
Regional Office	.09	.081	.07
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1961

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Pennebaker	8/19/59
Branch Chief	HHE	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Migration and growth studies of tagged redfish at Eastport, Maine

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker, F. R. B., GS-7

Collaborators: None

Need for Information: It is possible to tag redfish at Eastport, Maine. Tagging is the most practical method of obtaining a direct measure of growth and evidence of migration. This tagging in shallow water affords an opportunity to observe the resistence of redfish to tagging damage for future work in deep water.

Objective: To determine the migratory tendencies of redfish.

Method of Procedure: Tag about 5,000 redfish at Eastport, Maine, and await their recapture by fishermen from other locations. Obtain measurements of growth of
Phase 1: recaptured fish.

Phase 2:

REDFISH - 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 47.2

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	2.7	2.5
Other Expenses: Within Project	2.0	2.4	3.0
Lab. Adm. & Ser.	4.0	3.0	1.6
Lab. Total	9.0	8.1	7.1
Regional Office	.09	.081	.071
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1961

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Penochar	8/19/59
Branch Chief	NWE	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Vertical distribution of pelagic young redfish

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker, F. R. B., GS-7

Collaborators: None

Need for Information: There is little knowledge of the distribution of young redfish or of the duration of the period they spend as planktonic larvae. This information is needed to understand the inter-relationship of populations that may be mixed by the drift of young fish from one area to another.

Objective: To obtain information on the distribution of young redfish in the upper and midwaters from the time they are spawned until they move to the bottom to live.

Method of Procedure: Sample the upper water layers with plankton nets and mid-water trawls at a series of stations in the Gulf of Maine during mid and late summer.

Phase 1:

Phase 2:

REDFISH - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 39.9

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	2.0	2.5
Other Expenses:			
Within Project	1.0	.5	3.2
Lab. Adm. & Ser.	5.2	4.6	1.4
Lab. Total	9.2	7.1	7.1
Regional Office	.092	.071	.071
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY1962

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Passenger	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by: Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: Racial studies - Identification of adult Sebastes in the North Atlantic Ocean

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker, F. R. B., GS-7
G. M. Clarke, F. A., GS-7
C. F. Bocken, F. A., GS-6

Collaborators: None

Need for Information: It is necessary to know the systematic units of redfish found in all parts of the North Atlantic Ocean in order to be able to define the limits of the populations or stocks of fish for management purposes. This is a fundamental problem but is a difficult one because of the similarities of Sebastes from all areas.

Objective: To classify the species or subspecies of Sebastes found in the North Atlantic Ocean.

Method of Procedure: Collect specimens from several widely separated areas and compare a large number of meristic and morphometric characteristics from each sample.

Phase 1:

Phase 2:

REDFISH - 6

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 37.9

	FY 1959	FY 1960	FY 1961
Personal Services	3.2	2.5	2.1
Other Expenses: Within Project	1.5	1.0	3.5
Lab. Adm. & Ser.	3.5	3.6	1.5
Lab. Total	8.2	7.1	7.1
Regional Office	.082	.071	.071
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1962

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph L. Pruitt	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Incidence of the copepod ectoparasite Sphyrion lumpi on redfish in the Gulf of Maine

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)
G. M. Clarke, F. A., GS-7

Collaborators: None

Need for Information: The parasite attaches to the skin of the redfish and forms a large cyst in the flesh where the head is embedded. The incidence of this animal serves as a natural mark of redfish populations. Infestation by this pest may cause mortality of small redfish. Removal of the encysted growths by the fish processors is an expensive operation. More knowledge is necessary in order to evaluate the damaging effects of this important parasite.

Objective: To determine the extent of parasite infection in Gulf of Maine redfish.

Method of Procedure: Record incidence of parasites on specimens in commercial redfish samples from all areas in the Gulf of Maine.

Phase 1:

Phase 2:

REDFISH - 7

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 36.8

	FY 1959	FY 1960	FY 1961
Personal Services	3.2	3.2	2.5
Other Expenses: Within Project	--	--	--
Lab. Adm. & Ser.	5.0	3.9	4.6
Lab. Total	8.2	7.1	7.1
Regional Office	.082	.071	.071
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1962

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Penniman	8/19/59
Branch Chief	JHE.	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Comparison of redfish growth rates between the Gulf of Maine and other North Atlantic areas

Investigation Title: Redfish

Investigation Chief: Kelly, G. F.

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker, F. R. B., GS-7

Collaborators: None

Need for Information: Knowledge of differences in growth rate between areas is necessary for use as a basis for management of the fish populations.

Objective: To determine the differences in growth rate between areas fished by U. S. vessels.

Method of Procedure: Employ age readings of redfish otoliths collected from different areas to determine the average growth rates of the redfish populations.

Phase 1:

Phase 2:

REDFISH - 8

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 38.6

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	2.5	2.0
Other Expenses: Within Project	--	--	--
Lab. Adm. & Ser.	6.2	4.6	5.1
Lab. Total	8.2	7.1	7.1
Regional Office	.082	.071	.071
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 1963

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Pruter	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Growth Rates of Redfish Stocks in the Gulf of Maine

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker F.R.B. GS-7

Collaborators: None

Need for Information: It is necessary to know the range of differences in growth rate of closely related redfish populations in order to properly plan the management of the Gulf of Maine redfish fishery.

Objective: To determine the average growth rates of redfish populations in the Gulf of Maine.

Method of Procedure:

Phase 1: Employ age readings of redfish otoliths collected from different parts of the Gulf of Maine to determine the differences in average growth rate.

Phase 2:

REDFISH - 9

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 36.4

	FY 1959	FY 1960	FY 1961
Personal Services		2.0	2.5
Other Expenses: Within Project		--	--
Lab. Adm. & Ser.		4.1	4.6
Lab. Total		6.1	7.1
Regional Office		.061	.071
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY60 ; Phase 2 FY ; Phase 3 FY ; Project FY 1964

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Dunnigan	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by: Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: Racial studies--Identification of Sebastes larvae.

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F.R.B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

G. M. Clarke F.A. GS-7

Collaborators: None

Need for Information: It is necessary to know the identifying marks of young fish of different stocks in order to trace the drift of the pelagic young to determine the recruitment of young to the population.

Objective: To identify the larvae of the species or subspecies of Sebastes in the North Atlantic Ocean.

Method of Procedure:

Phase 1: Collect larvae from gravid females of known stocks and determine the characteristics or field marks by which they can be distinguished.

Phase 2:

REDFISH - 10

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 36.4

	FY 1959	FY 1960	FY 1961
Personal Services			2.0
Other Expenses: Within Project			2.0
Lab. Adm. & Ser.			2.1
Lab. Total			6.1
Regional Office			.061
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 1965

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director		8/19/59
Branch Chief	[signature]	12-24-59

Approved by:

Division Chief for Director [signature]

Remarks

(Continue on reverse side)

#715 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: Migration studies--tagging redfish in deep water.

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F.R.B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker	F.R.B.	GS-7
Vacant	F.R.B.	GS-7

Collaborators: None

Need for Information: The movements of redfish on the commercial fishing grounds are little known. Tagging is the best direct method of detecting migration. Successful deep water tagging would furnish vital evidence for the study of redfish populations.

Objective: To develop techniques of tagging redfish from deep water (100 fathoms +) for migration studies.

Method of Procedure:

Phase 1: Devise traps or methods capable of collecting redfish from deep water for tagging at or near the surface.

Phase 2:

REDFISH - 11

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 36.2

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	2.5
Other Expenses:			
Within Project			2.5
Lab. Adm. & Ser.			1.1
Lab. Total			6.1
Regional Office			.061
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 65

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph H. Blunetta	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Underwater television study of redfish behavior at Eastport, Maine.

Investigation Title: Redfish

Investigation Chief: G. F. Kelly

Project Leader: G. F. Kelly (Name) F. R. B. (Title) GS-11 (Grade)

Assistants: (Title and Grade)

A. M. Barker	F. R. B.	GS-7
R. J. Livingston	F. R. B.	GS-9
J. M. Crossen	Elec. Eq. Spec.	GS-9
Vacant	F. R. B.	GS-7

Collaborators:

None

Need for Information: Little is known of the feeding and sc hooling behavior of redfish on the commercial grounds. Virtually nothing is known of the breeding habits of the species. The shallow water redfish population at Eastport, Maine, offers an excellent opportunity to study these characteristics at close hand.

Objective: To view and photograph the behavior of redfish in their natural habitat at Eastport, Maine, with special interest in recording the spawning activities.

Method of Procedure:

Phase 1: Set T.V. camera on bottom near the dock and observe the day and night activities of redfish as they move into the dock area to feed.

Phase 2:

REDFISH - 12

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 35.2

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	2.0
Other Expenses:			
Within Project			1.0
Lab. Adm. & Ser.			3.0
Lab. Total			6.1
Regional Office			.061
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY65

Recommended by:

		Date
Originator	George F. Kelly	8/6/59
Investigation Chief	George F. Kelly	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph L. Runnerstrom	8/19/59
Branch Chief	[illegible]	12-24-65

Approved by:

Division Chief for Director	[illegible]	1-26-

Remarks

(Continue on reverse side)

Please check time schedule. To 1965 seems rather long.

#715 7/9/59

POLLOCK AND OTHER BOREAL GROUNDFISH SPECIES--JUSTIFICATION

Pollock and other boreal groundfish species (cusk, wolffish, halibut, etc.) occupy a position in the groundfish community which is not well understood at the present time. These species are mostly taken incidental to haddock fishing and are important in serving as a buffer when haddock abundance declines. Pollock landings currently average about 22 million pounds per year and are worth about one million dollars. The recorded landings of pollock probably represent a small fraction of the available resource.

The availability, abundance and life histories of the New England stocks of these species require investigation in order to properly assess their role as food fishes. The plan of the investigation for each species would be to first estimate the magnitude of the resource and its distribution and availability throughout the year. Since pollock will probably become more important in the future as a source of protein food, data accumulated and analyzed now on the relative abundance and distribution of the species will be of value to the industry in planning increased exploitation in the future.

The second phase of the investigation would be to gain an understanding of the life histories of the species, using recognized fishery biology methods. The accumulation of a fund of knowledge is required to consider the efficacy of management procedures.

Similar studies of cusk, wolffish and other species will be started as time allows. Certain basic information may be collected in all of these species simultaneously.

August 6, 1959

POLLOCK AND OTHER BOREAL GROUNDFISH SPECIES--JUSTIFICATION

List of Projects

1. Abundance and distribution of pollock
2. Age and growth of pollock, tech. and validation
3. Age and growth of pollock
4. Definition of pollock stocks--tagging
5. Abundance and distribution of cusk and wolffish
6. Age and growth of cusk and wolffish technique
7. Age and growth studies of cusk and wolffish
8. Food habits of pollock, cusk and wolffish
9. Fecundity of pollock, cusk and wolffish
10. Routine collection of samples and data

SUMMARY CONTROL SCHEDULE

Investigation: Pollock

Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Abundance and Distribution of Pollock	13.0	--	--	--	--	7.0	6.0	--	--	--	--
2. Age and growth of Pollock, tech. and validation	13.0	--	--	--	--	7.0	6.0	--	--	--	--
3. Age and growth of Pollock	35.0	--	--	--	--	7.0	6.0	8.0	7.0	7.0	--
4. Definition of Pollock stocks - Tagging	30.7	--	--	--	--	--	--	8.0	7.7	7.0	8.0
5. Abundance and distribution of Cusk and Wolffish	14.0	--	--	--	--	--	6.0	8.0	--	--	--
6. Age and growth of Cusk and Wolffish technique	15.2	--	--	--	--	--	--	8.0	7.2	--	--
7. Age and growth Studies of Cusk and Wolffish	23.5	--	--	--	--	--	--	--	7.2	7.3	9.0
8. Food Habits of Pollock, Cusk and Wolffish	23.2	--	--	--	--	--	--	--	7.2	7.0	9.0
9. Fecundity of Pollock, Cusk and Wolffish	15.0	--	--	--	--	--	--	--	--	7.0	8.0
10. Routine Collection of Samples and data	35.1	--	--	--	--	2.8	2.6	8.6	5.6	7.0	8.5
Investigation Total	217.7	--	--	--	--	23.8	26.6	40.6	41.9	42.3	42.5

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham 8/6/59

Reg. or Area Dir. Joseph L. Pruvostas

Branch Chief Noted - NHE 12-24-59

Approved by:

Division Chief for Director

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

#714 7/9/59

Investigation should be delayed pending Personnel & funds.

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: Abundance and Distribution

Investigation Title: Pollock and other boreal groundfish.

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To provide a basis for possible management of pollock by assessing how much is utilized, how much is available and where it is found throughout the year. Pollock has served as a buffer when haddock abundance declines, and it is probably not properly exploited.

Objective: To determine the amount landed, the amount caught and the areas where it is available. Historic data.

Method of Procedure:

Phase 1: Examination of landing records, interviews, sea sampler records, survey cruise data.

Phase 2: Analysis of records and preparation of reports for Science and Industry Journals.

Scheduling:

Phase I: Completion June 1961

Phase II: Completion June 1962 (Phase out to Biostatistics)

POLLOCK - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 13,0

	FY 1959	FY 1960	FY 1961
Personal Services			0.5
Other Expenses:			
Within Project			0.2
Lab. Adm. & Ser.			6.3
Lab. Total			7.0
Regional Office			.07
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 1962

Recommended by:

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

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Investigation should be delayed pending personnel and funds. HHE 12-24-59

#715 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: Pollock, validation of age and growth techniques

Investigation Title: Pollock and other boreal groundfish.

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To be able to determine growth rates, a method must be developed that will result in an accurate assessment of age of the fish.

Objective: To develop and validate a method for aging pollock.

Method of Procedure: Collection of scales, otoliths and fin rays for study.
Determination of best technique.
Phase 1: Validation of procedure.

Phase 2:

POLLOCK - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 13.0

	FY 1959	FY 1960	FY 1961
Personal Services			2.0
Other Expenses:			
Within Project			0.5
Lab. Adm. & Ser.			4.5
Lab. Total			7.0
Regional Office			.07
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61 ; Phase 2 FY ; Phase 3 FY ; Project FY 1962

Recommended by:

		Date
Originator	R. L. Edwards	8/6/59
Investigation Chief		
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Denucchas	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Investigation should be delayed pending personnel and funds. HHE 12-24-59

#715 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: Pollock, age and growth.

Investigation Title: Pollock and other boreal groundfish.

Investigation Chief: Vacant

Project Leader: Vacant

Name	Title	Grade

Assistants: (Title and Grade)

Vacant	Stat. Clerk	GS-3

Collaborators:

Need for Information: Age and growth data is basic to all further studies of a species and is especially important for establishing parameters for studies of population dynamics. Any future management plans must first consider age and growth data.

Objective: To provide necessary data to set up population models.

Method of Procedure:

Phase 1: Collection of material (Survey Cruise and commercial catch).

Phase 2: Analysis of scale orotalith reading and validation of technique.

Phase 3: Preparation of report for Science Journal

(over)

Scheduling:

Phase I: Completion June 1962

Phase II: Completion June 1964

Phase III: Completion June 1965

Budget:

Personal Services	$1,500.00
Expenses	200.00
Total	$1,700.00

Method of publicizing results: Scientific Journals

POLLOCK - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 35.0

	FY 1959	FY 1960	FY 1961
Personal Services			2.0
Other Expenses:			
Within Project			0.5
Lab. Adm. & Ser.			4.5
Lab. Total			7.0
Regional Office			.07
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 65

Recommended by:

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

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Investigation should be delayed pending personnel and funds. HHE 12-24-59

#715 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: Pollock - routine collection of biological data

Investigation Title: Pollock and other boreal groundfish

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Material must be provided by sources other than port pool and research vessel cruises to enable this investigation to get under way quickly. Some charter and assistance from commercial fishermen necessary.

Objective: To collect necessary biological material and data to allow a successful prosecution of research goals.

Method of Procedure:

Phase 1: Arrangements with commercial fishermen for the special effort of saving particular material.

Phase 2:

POLLOCK - 10

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 35.1

	FY 1959	FY 1960	FY 1961
Personal Services			0.5
Other Expenses:			
Within Project			0.2
Lab. Adm. & Ser.			2.1
Lab. Total			2.8
Regional Office			.028
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 66

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

Remarks

(Continue on reverse side)

Investigation should be delayed pending personnel and funds. HHE 12-24-59

#715 7/9/59

HAKE INVESTIGATIONS

The hakes represent one of the three major species groups of the New England and Middle Atlantic area. The hake group includes the red hake (Urophycis chuss), the white hake (U. tenuis), the silver hake (Merluccius bilinearis), the American Hake (M. albidus), and several others of no immediate importance.

These fishes support food fisheries to a moderate extent and the industrial fisheries to a great extent. They are sufficiently similar from a morphological and ecological viewpoint that they are best studied as a group. At this time, it is particularly vital that this investigation concern itself with an intensive life history program designed to establish those population parameters required to make judgments on proper management procedures.

August 6, 1959

21. The distribution and abundance of the American hake
22. The definition of stocks of the American hake
23. Vertical distribution of the American hake
24. Seasonal distribution of the American hake
25. A study of the eggs and larva of the American hake

SUMMARY CONTROL SCHEDULE

Investigation: Hake
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years									
		57	58	59	60	61	62	63	64	65	66
Silver Hake											
1. The definition of silver hake stocks	8.0	8.0	--	--	--	--	---	--	--	--	--
2. Tagging methods for the silver hake	18.0	8.0	10.0	--	--	--	--	--	--	--	--
3. Age and growth of the silver hake	29.0	8.0	10.0	8.0	3.0	--	--	--	--	--	--
4. Length and weight relationship of the silver hake	21.0	--	10.0	8.0	3.0	--	--	--	--	---	--
5. Seasonal movements of the silver hake	23.5	--	--	8.0	3.0	3.5	4.0	5.0	--	--	--
6. An evaluation of the fishing effort data	32.5	8.0	10.0	8.0	3.0	3.5	--	--	--	--	--
7. Vertical distribution of the silver hake	20.5	--	--	--	3.0	3.5	4.0	5.0	5.0	--	--
8. The study of possible management techniques	26.2	--	--	--	--	--	4.0	5.0	5.0	6.0	6.2
9. The application of serological techniques	26.2	--	--	--	--	--	4.0	5.0	5.0	6.0	6.2
White hake											
10. Age and growth of white hake	17.2	--	--	--	--	--	--	--	5.0	6.0	6.2
11. The length and weight relationship of the white hake	17.2	--	--	--	--	--	--	--	5.0	6.0	6.2
12. Seasonal distribution of the white hake	12.2	--	--	--	--	--	--	--	--	6.0	6.2

SUMMARY C[illegible]ROL SCHEDULE

Investigation: Hake
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Red hake											
13. The development of aging techniques	33.5	8.0	10.0	8.0	4.0	3.5	--	--	--	--	--
14. Age and growth of the red hake	24.5	--	--	8.0	4.0	3.5	4.0	5.0	--	--	--
15. Distribution and abundance of the red hake	30.7	--	--	--	--	3.5	4.0	5.0	5.0	6.0	7.2
16. Seasonal movements of the red hake	23.5	--	--	--	--	3.5	4.0	5.0	5.0	6.0	--
17. A review of red hake biology	33.5	7.9	10.6	8.5	3.0	3.5	--	--	--	--	--
American hake											
18. The development of aging techniques	11.1	--	--	--	3.6	3.5	4.0	--	--	--	--
19. Age and growth of the American hake	17.5	--	--	--	--	3.5	4.0	5.0	5.0	--	--
20. The length and weight relationship	17.4	--	--	--	--	2.2	5.0	5.2	5.0	--	--
21. The distribution and abundance of the Amer. hake	24.4	--	--	--	--	3.0	5.2	6.2	5.0	5.0	--
22. The definition of stocks of the American hake	28.6	--	--	--	--	--	5.2	6.2	5.0	5.0	7.2
23. Vertical distribution of the American hake	22.4	--	--	--	--	--	--	6.2	4.0	5.0	7.2
24. Seasonal distribution of the American hake	16.2	--	--	--	--	--	--	--	4.0	5.0	7.2
25. A study of the eggs and larva of the Amer. hake	16.2	--	--	--	--	--	--	--	3.8	5.1	7.3
Investigation Total	551.0	47.9	60.6	56.5	29.6	40.2	51.4	63.8	66.8	67.1	67.1

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Raymond L. Fritz — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir. Joseph E. Reynolds 8/19/59

Branch Chief [illegible] 12-24-59.

Approved by: [illegible]

Division Chief for Director

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

#714 7/9/59

Objectives and procedures usually not [illegible]

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 the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: Raymond L. Fritz, acting

Project Leader: Raymond L. Fritz F.R.B. GS-7
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Age and growth of a particular species is a basic research project and the results are required for other projects. This information is used to determine the age composition of the commercial catch or population, age at maturity and mortality rates.

Objective: To determine the growth rate of the silver hake in the Gulf of Mexico.

Method of Procedure: To collect and analyze otoliths from samples of all sizes of fish at several times a year.

Phase 1:

Phase 2:

Hake 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 29.0

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	1.8	---
Other Expenses:			
Within Project	0.6	0.1	---
	---	---	---
Lab. Adm. & Ser.	5.4	1.1	---
Lab. Total	8.0	3.0	---
Regional Office	.08	.03	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Unmacht	8/19/59
Branch Chief	NHE	12-24-59

Approved by:

Division Chief for Director		1-2-60

Remarks

(Continue on reverse side)

#715 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: Length Weight relationship of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: Raymond L. Fritz, acting

Project Leader: Raymond L. Fritz F.I.B. GS-9
Name Title Grade

Assistants: (Title and Grade)

William H. Callahan Stat. Clerk GS-4

Collaborators:

Need for Information: To be able to evaluate the landings into number and weight of each fish in the catch. This information is also used in the computations for population dynamics and growth.

Objective: To determine the changes in body weight by month and season and the changes that might occur from one year to another.

Method of Procedure: Samples will be collected, the length and weight recorded. The basic analysis of the data

Phase 1: will be accomplished by using I.B.M. machines.

Phase 2:

Make 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 21.0

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	1.0	---
Other Expenses: Within Project	0.6	0.1	---
	---	---	---
Lab. Adm. & Ser.	5.4	1.9	---
Lab. Total	8.0	3.0	---
Regional Office	.08	.03	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Dunnigan	8/19/59
Branch Chief	W.H.E.	12-24-59

Approved by:

Division Chief for Director		1-2-60

Remarks

(Continue on reverse side)

#715 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: Seasonal movements of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz

Project Leader: R. L. Fritz, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The seasonal movements of this species remain unknown at this time. In order to delineate the population stocks, the seasonal movements or migratory patterns must be determined.

Objective: The seasonal distribution should be studied in order to determine the extent and the reasons for the migrations.

Method of Procedure: Tagging and surveys are necessary to complete this project.

Phase 1:

Phase 2:

Hake 5 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.5

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.1
Other Expenses: Within Project	0.5	0.1	0.4
	---	---	---
Lab. Adm. & Ser.	6.5	1.9	2.0
Lab. Total	8.0	3.0	3.5
Regional Office	.08	.03	.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY ; Phase 3 FY ; Project FY 63

		Date
Recommended by: Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by: Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: An evaluation of the fishing effort on the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: R. L. Fritz, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: A study of the fishing effort will aid the biologist in determining the relative abundance from year to year. A study of this type is necessary to define the variations that occur and to relate these variations to the biological and physical changes.

Objective: To determine the fishing effort in catch per hour or day of the whiting fleet of Gloucester, Mass.

Method of Procedure: An analysis of the number of pounds caught and the time involved by vessel category, by vessels catching 50 percent or more silver hake.

Phase 1:

Phase 2:

Hake 6 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 32.5

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	2.0
Other Expenses:			
Within Project	0.4	0.1	0.4
	---	---	---
Lab. Adm. & Ser.	6.6	1.9	1.1
Lab. Total	8.0	3.0	3.5
Regional Office	.08	.03	.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Penner Jr.	8/19/59
Branch Chief	WHE	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: Vertical distribution of the Silver Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: to be assigned
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To fully understand the movements of this species not only from one area to another, but vertically from the bottom to the surface.

Objective: To define the nature and scope of the diurnal migrations of the silver hake.

Method of Procedure: To conduct fishing operations at several offshore stations for a 24-hour period.

Phase 1:

Phase 2:

Hake 7 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 20.5

	FY 1959	FY 1960	FY 1961
Personal Services	---	1.0	2.0
Other Expenses:			
Within Project	---	0.1	0.4
	---	---	---
Lab. Adm. & Ser.	---	1.9	1.1
Lab. Total	---	3.0	3.5
Regional Office		.03	.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60 ; Phase 2 FY ; Phase 3 FY ; Project FY 64

		Date
Recommended by:		
Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Zimmerher	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: The Development of ageing techniques for the Red Hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: R. L. Edwards, Fishery Research Biologist, GS-12
Name Title Grade

Assistants: (Title and Grade)

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

Collaborators:

Need for Information: The red hake is the principal species caught by the industrial fishery. In order to determine the age composition of the red hake a method for ageing this species must be developed.

Objective: To examine the scales, otoliths and possibly other hard parts to determine the best indicator of age.

Method of Procedure: Collections of scales, otoliths and other parts to be made monthly throughout the year. An examination of these parts and
Phase 1: an analysis of the data will be published.

Phase 2:

Hake 13 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.5

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.0
Other Expenses: Within Project	0.3	0.1	0.1
---	---	---	---
Lab. Adm. & Ser.	6.7	2.9	2.4
Lab. Total	8.0	4.0	3.5
Regional Office	.080	.04	.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Quinceton	8/19/59
Branch Chief	2HE.	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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 of the red hake

Investigation Title: Hake Investigation

Investigation Chief: R. L. Fritz, acting

Project Leader: R. L. Edwards, Fishery Research Biologist, GS-12
Name Title Grade

Assistants: (Title and Grade)

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

Collaborators:

Need for Information: The age and growth of the red hake is of particular interest to the industrial fishery. The results from this study will determine the rate of growth of this species. These results can be used in other fishery problems such as population studies, age at maturity and others.

Objective: The objective of this study is to determine the rate of growth of the red hake in New England waters. This is not the objective

Method of Procedure: Collections made at several times a year of all available sizes of fish.

Phase 1:

Phase 2:

Hake 14 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 24.5

	FY 1959	FY 1960	FY 1961
Personal Services	0.6	1.0	1.0
Other Expenses:			
Within Project	0.1	0.1	0.4
---	---	---	---
Lab. Adm. & Ser.	7.3	2.9	2.1
Lab. Total	8.0	4.0	3.5
Regional Office	.08	.04	.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY ; Phase 3 FY ; Project FY 63

Recommended by:

		Date
Originator	R.L.Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Quinn	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: **Distribution and abundance of red hake**

Investigation Title: **Hake (presently part of Whiting sub-investigation)**

Investigation Chief: **R. L. Frits**

Project Leader:	**R. L. Edwards**	**F.R.B.**	**GS-12**
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Frits	**F.R.B.**	**GS-9**
L. Lawday	**F.A.**	**GS-5**
W. Callahan	**Stat. Clerk**	**GS-5**

Collaborators:

Need for Information: **This species is the backbone of the industrial fishery. It is apparently fished heavily only in limited areas within its total range which is unknown. The present level of exploitation can only be crudely estimated pending more extensive information about the distribution and abundance of the entire population.**

Objective: **To define the distribution and relative abundance of the red hake, by season, in the Gulf of Maine and in the Middle Atlantic region.**

Method of Procedure:

Phase 1: **Analysis of previous census cruise data and further research vessel trips, particularly trips that promise to locate the winter-time centers of abundance.**

Phase 2:

Hake 15 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 30.7

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.	---	---	2.3
Lab. Total	---	---	3.5
Regional Office			.035
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	**R. L. Fritz**	**8/6/59**
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Penniston	8/19/59
Branch Chief	WHE	12-24-59

Approved by:

Division Chief for Director	JLH	

Remarks

(Continue on reverse side)

#715 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: **Seasonal movements of red hake.**

Investigation Title: **Hake (presently included in whiting)(industrial sub-investigation**

Investigation Chief: **R. L. Fritz, Acting**

Project Leader:	**R. L. Edwards**	**F. R. B.**	**GS-12**
	Name	Title	Grade

Assistants: (Title and Grade)

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

Collaborators:

Need for Information: **The red hake so far has been difficult to tag. There seems to be at least two fairly distinct groups of red hake in the New England area. Somehow, perhaps by defining the seasonal movements, using commercial and research vessel catch data, it will prove possible to demonstrate that stocks do or do not exist in the area.**

Objective: **To define seasonal movements and to provide data that may be used to help define the presence or absence of stocks based on evidence of differential movements of groups of red hake.**

Method of Procedure:

Phase 1: **Analysis of commercial and research vessel catch data. Further cruises planned to check hypothises and to do experimental tagging.**

Phase 2:

Hake 16

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.5

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.		---	2.3
Lab. Total	---	---	3.5
Regional Office			.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 65

Recommended by:

		Date
Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: **A review of the red hake biology**

Investigation Title: **Hake Investigation**

Investigation Chief: **R. L. Fritz, Acting**

Project Leader:	**R. L. Edwards**	**FRB**	**GS-12**
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Fritz	**FRB**	**GS-9**

Collaborators:

Need for Information: **A compilation of the present knowledge of the red hake is needed in order to intelligently plan future research.**

Objective: **To review all information on the red hake.**

Method of Procedure: **To write a review of the biology of the red hake, incorporating all aspects of fishery biology.**

Phase 1:

No! The method is to search the literature and abstract it for future use. Read

Phase 2:

Hake 17 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.5

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	2.0
Other Expenses:			
Within Project	0.2	0.1	0.5
---	---	---	---
Lab. Adm. & Ser.	7.3	1.9	1.0
Lab. Total	8.5	3.0	3.5
Regional Office	.085	.03	.035
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	R.L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	[illegible]	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: The development of Ageing techniques for the American hake.

Investigation Title: Hake Investigation.

Investigation Chief: R. L. Fritz, Acting

Project Leader:	R. L. Fritz	FRB	GS-9
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards	FRB	GS-12

Collaborators:

Need for Information: Using bony body parts, to develop an aging technique in order to determine the growth rate and age composition of the American hake.

Objective: To determine the best possible method for aging the American hake.

Method of Procedure: To collect scales, otoliths and other parts and examine each of these for the best method.

Phase 1:

Phase 2:

Hake 18 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 111

	FY 1959	FY 1960	FY 1961
Personal Services	---	2.0	2.0
Other Expenses:			
Within Project	---	0.2	0.5
	---	---	---
Lab. Adm. & Ser.	---	1.4	1.0
Lab. Total	---	3.6	3.5
Regional Office		.036	.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:
Originator R. L. Fritz 8/6/59 Date

Investigation Chief R. L. Fritz 8/6/59
Laboratory Director Herbert W. Graham 8/6/59
Regional Director Joseph F. Pomeroy 8/19/59
Branch Chief [illegible] 12-24-59
Approved by:
Division Chief for Director [illegible] 1-2 60

Remarks

(Continue on reverse side)

#715 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 of the American Hake(Merluccius olbidus)

Investigation Title: Hake (project presently in industrial)

Investigation Chief: R. L. Fritz, Acting

Project Leader:	R. L. Fritz	FRB	GS-9
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards	FRB	GS-12

Collaborators:

Need for Information: The American hake is as yet unexploited and represents a potential fishery. A research effort directed toward it now will serve two purposes:- (1) it will aid in the interpretation of population studies of exploited fishes, and (2) will do the ground work on the population that should be done on any species prior to exploitation.

Objective: To define the growth rate and its variations, geographically and as a result of environmental change.

Method of Procedure:

Phase 1: Analysis of the studies being conducted on the use of scales and ololiths as tools for aging this species.

Phase 2:

Hake 19 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 17.5

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	2.0
Other Expenses:			
Within Project	---	---	0.5
	---	---	---
Lab. Adm. & Ser.	---	---	1.0
Lab. Total	---	---	3.5
Regional Office			.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ___; Phase 3 FY ___; Project FY 64

		Date
Recommended by:		
Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: Length and weight relationship of the American hake.

Investigation Title: Hake Investigations

Investigation Chief: R. L. Frits, Acting

Project Leader:	R. L. Frits	FRB	GS-9
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards	FRB	GS-12

Collaborators:

Need for Information: Data needed in the analysis of the species as a resulting potential fishery resource.

Objective: To determine the seasonal variations in length-weight relationship of the Americ n hake.

Method of Procedure: Collect of length-weight data from material obtained on survey cruises.

Phase 1: Statistical analysis of data.(IBP)

Phase 2:

Make 20 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 17.4

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.			1.0
Lab. Total	---	---	2.2
Regional Office			.022
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY64

		Date
Recommended by: Originator	R. L. Fritz	8/6/59
Investigation Chief	R. L. Fritz	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	SIGNED: JOSEPH F. PUNCOCHAR	8/19/59
Branch Chief	HOWARD H. ECKLES	12-24-59
Approved by: Division Chief for Director		1-2 60

Remarks

(Continue on reverse side)

#715 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: **Distribution and abundance of the American hake.**

Investigation Title: **Hake Investigation.**

Investigation Chief: **R. L. Frits, Acting**

Project Leader:	**R. L. Frits**	**FRB**	**GS-9**
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards	**FRB**	**GS-12**

Collaborators:

Need for Information: **The information collected in this project will determine the distribution during the year and the availability of this species for commercial exploitation.**

Objective: **To determine the distribution and abundance of the American hake.**

Method of Procedure: **Collect and analyse data from survey cruises.**

Phase 1:

Phase 2:

Lake 21 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 24.4

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	2.0
Other Expenses:			
Within Project	---	---	1.0
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	3.0
Regional Office			.03
Washington Office			
Total			

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

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

Recommended by:
Originator R. L. Fritz 8/6/59 Date

Investigation Chief R. L. Fritz 8/6/59

Laboratory Director Herbert W. Graham 8/6/59

Regional Director SIGNED: JOSEPH F. PUNCOCHAR 8/19/59

Branch Chief HOWARD H. ECKLES 12-24-59

Approved by:
Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 7/9/59

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 CO ROL 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

Laboratory	Regional or Area Office	Washington Office

Prepared by: Robert L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir. Joseph A. Director

Branch Chief [illegible] 12/27/59

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: R. L. Edwards (Name) F. R. B. (Title) GS-12 (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.

Phase 2:

Scup 1
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 26.0

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.5	2.0
Other Expenses:			
Within Project	0.1	0.1	0.1
Lab. Adm. & Ser.	0.2	0.8	1.0
Lab. Total	0.8	1.4	3.1
Regional Office	.008	.014	.031
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	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Dumortier	8/19/59
Branch Chief	WHE.	12-24-59
Approved by:		
Division Chief for Director		1-2-60

Remarks

(Continue on reverse side)

#715 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: Migrations of various scup stocks

Investigation Title: Scup and other Mid-Atlantic groundfish

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

Project Leader: L. M. Lawday (Name) F. A. (Title) GS-5 (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 form 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:

Scup 2
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 125.2

	FY 1959	FY 1960	FY 1961
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:

		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	Joseph F. Pomeroy	8/19/59
Branch Chief	WHE	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: Evaluation of scup aging techniques

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

Investigation Chief: R. L. Edwards

	Name	Title	Grade
Project Leader:	L. M. Lawday	F. A.	GS-5
	R. R. Stoddard	Stat. Clerk	GS-5

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:

Scup 3
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 2.2

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	1.0	---
Other Expenses:			
Within Project	0.1	0.1	---
	---	---	---
Lab. Adm. & Ser.	0.2	0.3	---
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	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pumerchar	8/19/59
Branch Chief	HWE	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

#715 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: Validation of butterfish ageing methods.

Investigation Title: Scup, et al.

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

Project Leader: R. L. Edwards (Name) F.R.B. (Title) GS-12 (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:

Phase 1: Comparison of butterfish otolith ages with modal length frequency groups and their progression in time.

Phase 2:

Scup 4
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 2.2

	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	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Rumreich	8/19/59
Branch Chief	NHE	12-24-59
Approved by:		
Division Chief for Director	[illegible]	1-2-60

Remarks

(Continue on reverse side)

Question staff time available -
Is project complete?

#715 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: Validation of tilefish ageing techniques

Investigation Title: Scup, et al.

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

Project Leader: L. M. Lawday (Name) F. A. (Title) GS-5 (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:

Phase 1: 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 2:

Scup 5
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 3.8

	FY 1959	FY 1960	FY 1961
Personal Services	0.4	0.5	0.5
Other Expenses:			
Within Project	0.1	0.1	0.1
---	---	---	---
Lab. Adm. & Ser.	0.3	0.8	1.0
Lab. Total	0.8	1.4	1.6
Regional Office	.008	.014	.016
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	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

Is staff time available?

#715 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: Feeding cycle of fishes

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

Investigation Chief: R. L. Edwards

Project Leader: R. L. Edwards (Name) F.R.B. (Title) GS-12 (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:

Phase 1: 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:

Scup 6 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 4.0

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.6	0.5
Other Expenses:			
Within Project	0.2	0.1	0.1
	---	---	---
Lab. Adm. & Ser.	0.3	0.7	1.0
Lab. Total	1.0	1.4	1.6
Regional Office	.01	.014	.016
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 61

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	Joseph F. Penneckar	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2 [illegible]

Remarks

(Continue on reverse side)

#715 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 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 and R. R. Stoddard — Lawday FA GS-5; Stoddard Stat. Clerk GS-5

Name — 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:

Scup 7 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 10.8

	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	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pfuntner	8/19/59
Branch Chief	NHE.	12-24-59

Approved by:

Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

Question staff time available?

#715 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 of southern New England butterfish

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

Investigation Chief: R. L. Edwards

Project Leader: R. L. Edwards (Name) F. R. B. (Title) GS-12 (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:

Scup 8 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 10.3

	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	R. L. Edwards	8/6/59
Investigation Chief	R. L. Edwards	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Puzzuchelli	8/19/59
Branch Chief	WHE	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-2-62

Remarks

(Continue on reverse side)

Question staff time available?

#715 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 of tilefish

Investigation Title: Scup and other middle Atlantic groundfish

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

Project Leader: L. M. Lawday (Name) F. A. (Title) GS-5 (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.

Scup 9 Sheet No. 2 File No.:

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:

		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	Joseph F. Pomeroy	8/19/59
Branch Chief		

Approved by:

Division Chief for Director _____ 12/60

Remarks

(Continue on reverse side)

Is staff time available?
HWE.

#715 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: Skate ageing techniques

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

Investigation Chief: R. L. Edwards

Project Leader: Vacant
Name Title Grade

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:

Scup 10 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 15.5

	FY 1959	FY 1960	FY 1961
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	Joseph G. Pincoffs	8/19/59
Branch Chief		

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

Is staff time available?

HWE.

JGP

#715 7/9/59

INDUSTRIAL FISHERY INVESTIGATIONS

The industrial fishery of New England harvests the entire catch of the otter trawl. Food species are sorted out of the catch and all others are sold for reduction. The industrial product is a major source of protein and growth factors in various livestock (especially chicken) feed.

This fishery represents the nearest approximation to date of a total harvesting of the useable marine resource. As such it presents unique problems and opportunities for study.

At present, sufficient life history data on the species involved is not available to suggest appropriate management measures. A vast body of data is accumulating as a result of our research on the fishery that provides a unique avenue of approach to other general and fundamental problems concerned with the ecology of fish communities. Such studies are being undertaken as our file of data becomes sufficiently comprehensive.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: Industrial
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Species composition of the Cape Cod to Cape Hatteras continental shelf groundfish	71.6	18.1	12.3	12.7	10.0	8.0	10.5	--	--	--	--
2. A review of the structure and ecology of the groundfish communities in the Middle Atlantic	58.1	17.6	12.0	11.0	9.6	7.9	--	--	--	--	--
3. Development of sampling theory	50.0	--	11.0	10.5	9.6	7.9	11.0	--	--	--	--
4. The relationship of water temperature to fish abundance	71.0	--	11.0	10.5	9.6	7.9	11.0	10.5	10.5	--	--
5. A study of possible management techniques for the industrial fishery	82.6	--	--	--	--	9.0	12.0	14.2	13.7	16.8	16.9
6. History and development of industrial fishery at Point Judith and biology of species involved--a summation	51.4	--	--	--	--	--	--	10.4	11.5	14.8	14.4
7. Species composition of the industrial landings	141.4	17.1	14.0	13.0	9.4	9.9	13.3	13.9	14.4	17.8	18.6
Investigation Total	525.8	52.8	60.3	57.7	48.2	50.6	57.8	49.0	50.1	49.4	49.9

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Raymond L. Fritz — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham — 8/6/59

Reg. or Area Dir. Joseph A. Pearson

Branch Chief [signature] 12/24/59

Approved by:

Division Chief for Director

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

#714 7/9/59

In view of limitations on the [illegible] funds this should be of intermediate priority Date 1-4-60

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: Species composition of the Cape Cod to Cape Hatteras groundfish.

Investigation Title: Industrial Investigation.

Investigation Chief: R. L. Edwards

Project Leader:	R. L. Fritz	FRB	GS-9
	Name	Title	Grade

Assistants: (Title and Grade)

W. Callahan	Stat. Clerk	GS-5

Collaborators:

Need for Information: A more adequate understanding of the number of species present along the continental shelf and their abundance is required, in view of the expanding trawl fishery and our new responsibilities in evaluating the effects of waste disposal.

Objective: To develop and maintain as complete records as possible of the Middle Atlantic fishery, including data on effort, area of capture and species composition.

Method of Procedure: Interviewing and sampling at the ports.

Phase 1:

Phase 2:

Industrial - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 71.6

	FY 1959	FY 1960	FY 1961
Personal Services	1.6	7.1	1.5
Other Expenses: Within Project	2.0	1.1	0.5
	--	--	--
Lab. Adm. & Ser.	9.1	1.8	6.0
Lab. Total	12.7	10.0	8.0
Regional Office	.127	.10	.08
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY 62

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	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 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: Review of the structure and ecology of the groundfish communities in the Middle Atlantic.

Investigation Title: Industrial Investigation

Investigation Chief: R. L. Edwards

Project Leader: R. L. Edwards (Name) FRB (Title) GS-12 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: An understanding of the relations of the groundfish communities to differences in environmental conditions in prerequisite to determining the effects of changes in environmental conditions.

Objective: To determine the interspecific and environmental relations of groundfish communities.

Method of Procedure: Data collection on survey cruises.

Phase 1:

Phase 2:

Industrial - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 58.1

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	2.0	1.5
Other Expenses: Within Project	1.0	0.5	0.5
Lab. Adm. & Ser.	9.0	7.1	5.9
Lab. Total	11.0	9.6	7.9
Regional Office	.11	.096	.079
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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 R. L. Edwards 8/6/59

Investigation Chief R. L. Edwards 8/6/59

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph F. Dumochel 8/19/59

Branch Chief 12-24-59

Approved by:

Division Chief for Director 1-4-60

Remarks

(Continue on reverse side)

#715 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: Development of sampling theory

Investigation Title: Industrial Investigation

Investigation Chief: R. L. Edwards

Project Leader: J. S. O'Connor (Fishery Aide - Summer Student and Grad. Asst) GS-4
Name Title Grade

Assistants: (Title and Grade)

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

Collaborators:

Dr. Saul Saila, Marine Laboratory, University of Rhode Island, (Phd sponsor of Mr. O'Connor

Need for Information: Present sampling procedures are based on tentative validation procedures. What is required is a firm statistical basis for the estimation of the level of precision and amount of bias in the sampling method.

Objective: To validate industrial sampling procedures.

Method of Procedure: Extended sampling and critical statistical analysis of samples for the effects that bias sampling and the precision of species composition estimates.

Phase 1:

Phase 2:

Industrial - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 50.0

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	2.0	1.5
Other Expenses:			
Within Project	0.5	0.5	0.5
	--	--	--
Lab. Adm. & Ser.	9.0	7.1	5.9
Lab. Total	10.5	9.6	7.9
Regional Office	.105	.096	.079
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58 ; Phase 2 FY ; Phase 3 FY ; Project FY 62

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	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 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: The relation of water temperature to fish abundance

Investigation Title: Industrial Investigation

Investigation Chief: R. L. Edwards

Project Leader: R. L. Edwards, Fishery Research Biologist, GS-12
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: This information will aid in understanding and predicting the relative abundance of various species on the fishing grounds as a function of temperature.

Objective: To specify the effects of the changes in water temperature on fish abundance.

Method of Procedure: To collect hydrographic information along with fishing operations.

Phase 1:

Phase 2:

Industiral - 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 71.0

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	2.0	1.5
Other Expenses:			
Within Project	0.5	0.5	0.5
	--	--	--
Lab. Adm. & Ser.	9.0	7.1	5.9
Lab. Total	10.5	9.6	7.9
Regional Office	.105	.096	.079
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58 ; 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	Joseph F. Quinn for Chas.	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 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: The study of possible management techniques for the industrial fishery

Investigation Title: Industrial Investigation

Investigation Chief: R. L. Edwards

Project Leader: R. L. Edwards, Fishery Research Biologist, GS-12
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: To develop background of knowledge on the effects of the application of possible management techniques on a multispecies fishery.

Objective: To determine the effect of various management techniques on the industrial fishery.

Method of Procedure: To analyze management techniques used in other fishery projects and the development of new methods applicable to the industrial
Phase 1: fishery if necessary. Statistical techniques and mathematical model studies required.

Phase 2:

Industrial - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 82.6

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	2.0
Other Expenses:			
Within Project	--	--	1.5
	--	--	--
Lab. Adm. & Ser.	--	--	5.5
Lab. Total	--	--	9.0
Regional Office			.09
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61 ; Phase 2 FY ; Phase 3 FY ; Project FY 66

		Date
Recommended by: 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	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by: Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 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: Species composition of Industrial fish landings(Annual Report)

Investigation Title: Industrial

Investigation Chief: R. L. Edwards

Project Leader:	L. M. Lawday	FA	GS-5
	Name	Title	Grade

Assistants: (Title and Grade)

R. L. Edwards	FRB	GS-12

Collaborators:

Need for Information: To provide industrial fishery industry with catch composition data that may be used in planning operations.

Objective: To define as well as possible, the species composition of industrial landings.

Method of Procedure: Annual data report

Phase 1: Port sampling
Statistical analysis at W.H. Lab

Phase 2:

Industrial - 7

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 141.4

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	2.0	2.0
Other Expenses:			
Within Project	2.0	0.3	2.5
--	--	--	--
Lab. Adm. & Ser.	9.0	7.1	5.4
Lab. Total	13.0	9.4	9.9
Regional Office	.13	.094	.099
Washington Office			
Total			

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

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

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	Joseph F. Demarchi	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 7/9/59

FLOUNDER INVESTIGATIONS

For many years flounders have formed an important part of the New England trawl catch. In 1957 the 5 species that are commercially exploited furnished about 20 percent of the ex-vessel value of fin-fish landed at New England ports. The annual catch of flounders has decreased in recent years, however, due mainly to reduced catches of yellowtail and blackback, the principal species in the catch.

It is important to specify the factors responsible for reduced catches and to study the biology of flounder species, especially with regard to vital statistics parameters, because such information is often of importance for efficient resource management. It is possible that the application of the results of biological research can raise the yield in those fisheries that have been intensively exploited.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: Flounder
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Yellowtail: Description of fishery and landings	7.0	3.6	2.1	1.3	---	---	---	---	---	---	---
2. Yellowtail: Definition of stocks	21.6	6.4	5.0	5.5	4.7	---	---	---	---	---	---
3. Yellowtail: Age and growth - So. New England ground	23.5	6.4	6.3	5.5	5.3	---	---	---	---	---	---
4. Yellowtail: Age and growth - Georges Bank	17.2	2.8	5.0	1.5	4.7	3.2	---	---	---	---	---
5. Yellowtail: Age and growth - Cape Cod ground	14.9	---	2.0	5.3	4.3	3.3	---	---	---	---	---
6. Yellowtail: Comparative abundance	48.6	1.7	2.3	1.6	0.9	3.3	5.9	6.5	7.0	8.7	10.7
7. Yellowtail: Fishing Mortality - So. New England ground	12.0	---	---	1.6	1.7	3.2	5.5	---	---	---	---
8. Yellowtail: Fishing Mortality - Cape Cod ground	9.5	---	---	1.2	1.2	1.6	5.5	---	---	---	---
9. Yellowtail: Fishing Mortality - Georges Bank	17.0	---	---	---	1.6	3.5	4.9	7.0	---	---	---
10. Yellowtail: Total Mortality - 3 grounds	14.3	---	0.9	1.4	1.6	1.6	2.1	6.7	---	---	---
11. Yellowtail: Recruitment study - 3 grounds	19.0	---	---	---	---	1.7	2.1	6.7	8.5	---	---
12. Yellowtail: General life history	23.9	---	---	---	---	---	2.1	4.6	8.5	8.7	10.3
13. Blackback: Maintain record of catch and samples	35.5	---	---	---	0.9	1.9	2.1	4.6	7.0	8.7	10.3
14. Fluke: Maintain record of catch and samples	35.0	---	---	---	0.9	1.6	2.1	4.6	6.8	8.7	10.3
15. Dab: Maintain record of catch and samples	33.7	---	---	---	---	1.6	2.1	4.4	6.7	8.6	10.3
16. Gray sole: Maintain record of catch and samples	32.9	---	---	---	---	1.6	2.1	4.4	6.7	7.8	10.3
Investigation Total	365.6	20.9	23.6	24.9	27.8	28.1	36.5	49.5	51.2	51.2	51.9

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: Fred E. Lux — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham — 8/6/59

Reg. or Area Dir. Joseph A. Beckwith

Branch Chief [illegible] 12-24-59

Approved by: [illegible]
Division Chief for Director

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

#714 7/9/59

Number of Projects could be reduced by combining age & growth projects and mortality projects.

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: Yellowtail: Description of fishery and landings

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Research Fishery Biologist GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To describe history of fishery, present status, and record landings as a preliminary to further yellowtail studies.

Objective: Study history of fishery and landings from past records.

Method of Procedure:

Phase 1: Examine history and methods of fishery.

Phase 2: Extract landings data from records.

Flounder - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 7.0

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	--	--
Other Expenses:			
Within Project	0.2	--	--
	--	--	--
Lab. Adm. & Ser.	0.6	--	--
Lab. Total	1.3	--	--
Regional Office	.013		
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58 ; Phase 2 FY 59 ; Phase 3 FY ; Project FY 59

Recommended by:		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Quinceltee	8/19/59
Branch Chief	2 HE	12-24-59
Approved by:		
Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: Yellowtail: Definition of Stocks

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
(Name, Title, Grade)

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: The identification of stocks or stock is a necessary prerequisite to population dynamics studies and management proposals.

Objective: To identify the limits of stock or stocks that are commercially exploited.

Method of Procedure:

Phase 1: Mark fish on the several grounds where yellowtail are caught commercially.

Phase 2: Interpret tag return information.

Flounder - 2
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 21.6

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.5	--
Other Expenses:			
Within Project	0.5	0.2	--
	--	--	--
Lab. Adm. & Ser.	4.0	3.0	--
Lab. Total	5.5	4.7	--
Regional Office	.055	.047	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph J. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Yellowtail: Age and Growth, Southern New England

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
(Name, Title, Grade)

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: Define this parameter for determing efficient utilization of yellowtail.

Objective: Work out age and growth of fish using scales and otoliths from commercial and experimental catches.

Method of Procedure:

Phase 1: Collect length, scale, and otolith samples by ground.

Phase 2: Read scales and otoliths, summarize and interpret data.

Flounder - 3
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.5

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.7	--
Other Expenses:			
Within Project	0.5	0.3	--
	--	--	--
Lab. Adm. & Ser.	4.0	3.3	--
Lab. Total	5.5	5.3	--
Regional Office	.055	.053	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Pruitt	8/19/59
Branch Chief		

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Suggest projects So. New England Georges Bank and Cape Cod ground be combined.

HHE.

#715 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: Yellowtail: Age and Growth, Georges Bank

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: Define this parameter for determining efficient utilization of yellowtail.

Objective: Work out age and growth of fish using scales and otoliths from commercial and experimental catches.

Method of Procedure:

Phase 1: Collect length, scale, and otolith samples by ground.

Phase 2: Read scales and otoliths, summarize and interpret data.

Flounder - 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 17.2

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	1.5	1.0
Other Expenses:			
Within Project	0.2	0.2	0.2
	--	--	--
Lab. Adm. & Ser.	0.8	3.0	2.0
Lab. Total	1.5	4.7	3.2
Regional Office	.015	.047	.032
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60 ; Phase 2 FY 61 ; Phase 3 FY ; Project FY 61

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Dunn Jr.	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Suggest project to New England, Georges and Cape Cod ground be combined. HHE 12-24-59

#715 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: Yellowtail: Age and growth, Cape Cod ground

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)

Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: Define this parameter for determining efficient utilization of yellowtail.

Objective: Work out age and growth of fish using scales and otoliths from commercial and experimental catches.

Method of Procedure:

Phase 1: Collect length, scale, and otolith samples by ground.

Phase 2: Read scales and otoliths, summarize and interpret data.

Flounder - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 14.9

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.0
Other Expenses:			
Within Project	0.3	0.3	0.3
	--	--	--
Lab. Adm. & Ser.	4.0	3.0	2.0
Lab. Total	5.3	4.3	3.3
Regional Office	.053	.043	.033
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY 61; Phase 3 FY ; Project FY 61

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Passerchio	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Suggest projects in New England, Georges and Cape Cod ground be combined. 11/16 12-24-59

#715 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: Yellowtail: Comparative abundance

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: Identification of cause or causes for drop in annual yellowtail catch so that some level of fishery prediction may be possible in near future.

Objective: To work out relative abundance of yellowtail, since 1942, in terms of catch/boat/day for the yellowtail vessels.

Method of Procedure:

Phase 1: Obtain catch and effort of yellowtail trips landed at New Bedford (where 2/3 of yellowtail are landed). Separate trips by vessel size, fishing area, and date.

Phase 2: Summarize and interpret data.

Flounder - 6

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 48.6

	FY 1959	FY 1960	FY 1961
Personnal Services	0.5	0.1	1.0
Other Expenses:			
Within Project	0.3	0.1	0.3
	--	--	--
Lab. Adm. & Ser.	0.8	0.7	2.0
Lab. Total	1.6	0.9	3.3
Regional Office	.016	.009	.033
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph G. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Yellowtail: Fishing mortality, Southern New England ground

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To determine estimate of this parameter for use in working out efficient utilization of yellowtail.

Objective: To analyze returns for fishing intensity and catch.

Method of Procedure:

Phase 1: Mark fish on this ground.

Phase 2: Tabulate returns, adjust data, and estimate fishing mortality.

Flounder - 7
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 12.0

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.5	1.0
Other Expenses:			
Within Project	0.3	0.3	0.2
	--	--	--
Lab. Adm. & Ser.	0.8	0.9	2.0
Lab. Total	1.6	1.7	3.2
Regional Office	.016	.017	.032
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief		

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Suggest projects on Mortality Studies be combined.

HDE.

#715 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: Yellowtail: Fishing mortality, Cape Cod ground

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
(Name, Title, Grade)

Assistants: (Title and Grade)

Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To determine estimate of this parameter for use in working out efficient utilization of yellowtail.

Objective: To analyze returns for fishing intensity and catch.

Method of Procedure:

Phase 1: Mark fish on this ground.

Phase 2: Tabulate returns, adjust data, and estimate fishing mortality.

Flounder - 8
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 9.5

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.2	0.5
Other Expenses:			
Within Project	0.3	0.1	0.1
	--	--	--
Lab. Adm. & Ser.	0.4	0.9	1.0
Lab. Total	1.2	1.2	1.6
Regional Office	.012	.012	.016
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 59; Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph L. Pomeroy	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Suggest projects on mortality studies be combined

HHE 12-24-59

#715 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: Yellowtail: Fishing mortality, Georges Bank

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To determine estimate of this parameter for use in working out efficient utilization of yellowtail.

Objective: To analyze returns for fishing intensity and catch.

Method of Procedure:

Phase 1: Mark fish on this ground.

Phase 2: Tabulate returns, adjust data, and estimate fishing mortality.

Flounder - 9

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 17.0

	FY 1959	FY 1960	FY 1961
Personal Services	--	0.5	1.3
Other Expenses:			
Within Project	--	0.2	0.2
	--	--	--
Lab. Adm. & Ser.	--	0.9	2.0
Lab. Total	--	1.6	3.5
Regional Office		.016	.035
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY60 ; Phase 2 FY ; Phase 3 FY ; Project FY63

Recommended by:

		Date
Originator	**Fred E. Lux**	**8/6/59**
Investigation Chief	Fred E. Lux	**8/6/59**
Laboratory Director	Herbert W. Graham	**8/6/59**
Regional Director	Joseph F. Pomeroy	**8/19/59**
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Suggest projects on mortality studies be combined.

#715 7/9/59

HHE 12-24-59

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: Yellowtail: Total mortality from major grounds

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To estimate this parameter for determining efficient utilization of yellowtail.

Objective: To use age frequency data (catch curves)for estimation of mortality.

Method of Procedure:

Phase 1: Combine age frequency data from commercial catch for several years, by ground.

Phase 2: Calculate total mortality estimates.

Flounder - 10

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 14.3

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.5	0.5
Other Expenses:			
Within Project	0.1	0.2	0.1
	--	--	--
Lab. Adm. & Ser.	0.8	0.9	1.0
Lab. Total	1.4	1.6	1.6
Regional Office	.014	.016	.016
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY58 ; Phase 2 FY ; Phase 3 FY ; Project FY 63

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Passano	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Suggest project on mortality studies be continued

HHE 12-24-59

#715 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: Yellowtail: Recruitment on major grounds

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: Estimate of parameter needed for determining efficient harvest.

Objective: To estimate number of recruits from experimental and commercial trawl catches.

Method of Procedure:

Phase 1: Calculate estimate of annual additions to stock.

Phase 2: Interpret data.

Flounder - 11
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 19.0

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	0.5
Other Expenses:			
Within Project	--	--	0.2
	--	--	--
Lab. Adm. & Ser.	--	--	1.0
Lab. Total	--	--	1.7
Regional Office			.017
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61 ; Phase 2 FY ; Phase 3 FY ; Project FY64

		Date
Recommended by:		
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph R. Pierce	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 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: Blackback: Maintain record of catch and samples

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To keep track of fluctuations and unusual happenings in fishery. To obtain samples of lengths and scales for future use.

Objective: To keep track of fluctuations and unusual happenings in fishery. To obtain samples of lengths and scales for future use.

Method of Procedure:

Phase 1: Record catches, collect lengths and scale samples from commercial catch.

Phase 2:

Flounder - 13
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 35.5

	FY 1959	FY 1960	FY 1961
Personal Services	--	0.2	0.5
Other Expenses:			
Within Project	--	0.1	0.1
	--	--	--
Lab. Adm. & Ser.	--	0.6	1.3
Lab. Total	--	0.9	1.9
Regional Office		.009	.019
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY ; Phase 3 FY ; Project FY 66

Recommended by:		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Director	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	1-1-60

Remarks

(Continue on reverse side)

#715 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: Fluke: Maintain record of catch and samples

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)

Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To maintain record of catch fluctuations and unusual events in the fishery. To obtain samples of lengths and scales for future use.

Objective: To maintain record of catch fluctuations and unusual events in the fishery. To obtain samples of lengths and scales for future use.

Method of Procedure:

Phase 1: Record catches, collect lengths and scale samples from commercial catches.

Phase 2:

Flounder - 14
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 35.0

	FY 1959	FY 1960	FY 1961
Personal Services	--	0.2	0.5
Other Expenses:			
Within Project	--	0.1	0.1
	--	--	--
Lab. Adm. & Ser.	--	0.6	1.0
Lab. Total	--	0.9	1.6
Regional Office		.009	.016
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY ; Phase 3 FY ; Project FY 66

		Date
Recommended by:		
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph H. Primrose	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	1-11-60

Remarks

(Continue on reverse side)

#715 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: Dab: Maintain record of catch and samples

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To maintain record of catch fluctuations and unusual events in the fishery. To obtain samples of lengths and scales for future use.

Objective: To maintain record of catch fluctuations and unusual events in the fishery. To obtain samples of lengths and scales for future use.

Method of Procedure:

Phase 1: Record catches, collect lengths and scale samples from commercial catches.

Phase 2:

Flounder - 15
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.7

	FY 1959	FY 1960	FY 1961
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 and Regular
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 66

Recommended by:		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph H. Prescher	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: Gray sole: Maintain record of catch and samples

Investigation Title: Flounder

Investigation Chief: F. E. Lux

Project Leader: F. E. Lux, Fishery Research Biologist, GS-9
Name Title Grade

Assistants: (Title and Grade)
Vacant, Statistical Clerk, GS-3

Collaborators:

Need for Information: To maintain record of catch fluctuations and unusual events in the fishery. To obtain samples of lengths and scales for future use.

Objective: To maintain record of catch fluctuations and unusual events in the fishery. To obtain samples of lengths and scales for future use.

Method of Procedure:

Phase 1: Record catches, collect lengths and scale samples from commercial catches.

Phase 2:

Flounder - 16
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 32.9

	FY 1959	FY 1960	FY 1961
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 and Regular
(S-K, Regular, Contributed, etc.)

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 66

Recommended by:

		Date
Originator	Fred E. Lux	8/6/59
Investigation Chief	Fred E. Lux	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph P. Pennycuick	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-7-60

Remarks

(Continue on reverse side)

#715 7/9/59

DOGFISH BIOLOGY--JUSTIFICATION

For more than a century, the spiny dogfish (Squalus acanthias) has been a source of great annoyance and economic loss to the commercial fishermen of New England. At certain times of the year dogfish are so prevalent that it becomes impossible to fish in areas otherwise productive of foodfishes. Dogfish tangle and destroy gill nets and line trawls. They clog the meshes of otter trawls and must be laboriously pulled out by hand. Fishermen are forced to throw individual dogfish over the side, picking them up by hand or with a pitchfork. This results in a loss of fishing time in addition to any loss by damage to the gear.

Dogfish consume herring, mackerel, cod, haddock, and other food fishes, although published reports of their food habits show them to be largely invertebrate feeders. Dogfish often attack and destroy quantities of fish hooked on line trawls.

The dogfish is potentially useful as an industrial fish and the technologists are planning research designed to find ways to handle the fish as both animal food and human food. A minimum of biological research should be done in conjunction with the technological research to round out these studies.

The skates as well are in need of similar study. Two common species already provide a significant poundage to the industrial landings.

Although there is a comparatively great number of scattered reports in the literature on the spiny dogfish, there are few detailed studies of the biology of the species. Most of the reports deal with the extraction, properties of, and Vitamin A content of the liver oil. Bigelow and Schroeder, Fishes of the Western North Atlantic, is concerned mostly with a description of the species, with notes on each phase of its life history. Templeman's 1944 study is the most complete life history study but he admittedly raises questions he is unable to answer. A Russian report briefly describes a method for determining the age of spiny dogfish.

Tagging studies were conducted by Templeman on the East Coast of Canada, and Clemens (and later Holland) on the West Coast of Canada. A limited amount of tagging has been done by the Woods Hole Laboratory.

August 6, 1959

DOGFISH BIOLOGY--JUSTIFICATION

List of Projects

1. Abundance and distribution of dogfish
2. Age and growth of dogfish, validation
3. Migrations of dogfish
4. Food habits of dogfish
5. Fecundity of dogfish
6. Abundance and distribution of common skates
7. Age and growth of skates, validation
8. Migration of skates
9. Food habits of skates
10. Collection of biological materials for study

SUMMARY CONTROL SCHEDULE

Investigation: Dogfish and Skates
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Abundance and distribution of dogfish	13.9	--	--	--	---	8.5	2.4	3.0	--	--	--
2. Age and growth of dogfish, validation	17.7	--	--	--	--	4.5	2.5	6.3	4.4	--	--
3. Migrations of dogfish	42.4	--	--	--	--	--	6.5	7.0	8.0	10.5	10.4
4. Food Habits of dogfish	22.7	--	--	--	--	--	2.3	2.9	4.1	6.6	6.8
5. Fecundity of dogfish	20.4	--	--	--	--	--	--	2.9	4.1	6.6	6.8
6. Abundance and distribution of common skates	9.2	--	--	--	--	3.9	2.4	2.9	--	--	--
7. Age and growth of skates, validation	15.9	--	--	--	--	--	2.3	6.3	7.3	--	--
8. Migration of skates	44.3	--	--	--	--	--	6.5	7.0	9.5	10.8	10.5
9. Food habits of skates	23.0	--	--	--	--	--	2.2	2.9	4.2	7.0	6.7
10. Collection of biological materials for study	3.6	--	--	--	--	3.6	--	--	--	--	--
Investigation Total	213.1	--	--	--	--	20.5	27.1	41.2	41.6	41.5	41.2

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir.

Branch Chief Noted HWE. 12-24-59.

Approved by:

Division Chief for Director

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

#714 7/9/59

Investigation must be delayed pending funds & personnel. Expenditures for [illegible] should not be ignored.

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: Abundance and distribution of dogfish

Investigation Title: Dogfish and Skates

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: For more than a century, dogfish have been a source of annoyance to commercial fishermen. Dogfish damage nets and seasonally seem to drive foodfish out of commercially fished areas. However, it is not known what size of dogfish population is involved and exactly in what areas these sharks may be found in different seasons of the year. Any program for controlling the dogfish must know how much and where.

Objective: To determine the seasonal abundance and distribution of the dogfish.

Method of Procedure:

Phase 1: Examine past and current survey cruise records. Examine records of interviews of commercial fishermen and cruise records of exploratory vessels. Review literature. Routinely interview commercial vessels in New England ports.

Phase 2: Analyze data and prepare reports for industry journals and SSR. Prepare an annual report for trade.

Dogfish - 1 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 13.9

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	0.8
Other Expenses:			
Within Project	--	--	0.2
	--	--	--
Lab. Adm. & Ser.	--	--	7.5
Lab. Total	--	--	8.5
Regional Office			.085
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	R. L. Edwards	8/6/59
Investigation Chief	~~R. L. Edwards~~	~~8/6/59~~
Laboratory Director	Herbert [illegible]. Graham	8/6/59
Regional Director		
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Investigation must be delayed pending funds and personnel.
HHE 12-24-59

#715 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 of spiny dogfish, validation

Investigation Title: Dogfish and skate

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The study of the population dynamics of dogfish requires a knowledge of growth rates.

Objective: To determine the growth rates of spiny dogfish.

Method of Procedure:

Phase 1: Collection and evaluation of materials that promise to be useful for ageing.

Phase 2:

Dogfish - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 17.7

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	0.7
Other Expenses:			
Within Project	--	--	0.2
	--	--	--
Lab. Adm. & Ser.	--	--	3.6
Lab. Total	--	--	4.5
Regional Office			.045
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	~~Rockbo Edwards~~	
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director		8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Investigation must be delayed pending funds + personnel.
HHE 12-24-59

#715 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: Abundance and distribution of common skates

Investigation Title: Dogfish and skates

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The skates are relatively abundant fishes on the offshore grounds and are continually coming under increasing direct fishing pressure. There are several species involved, about which little or nothing is known.

Objective: To survey the relative abundance and distribution of the several common species of skates, by season, Cape Sable to Cape Hatteras.

Method of Procedure:

Phase 1: Analysis of all available pertinent research vessel data, commercial catch data and plan proper research vessel operations in conjunction with other cruises.

Phase 2:

Dogfish - 6

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 9.2

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	0.5
Other Expenses:			
Within Project	--	--	0.2
	--	--	--
Lab. Adm. & Ser.	--	--	3.2
Lab. Total	--	--	3.9
Regional Office			.039
Washington Office			
Total			

Recommended Source of Funds S-K
(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	Joseph F. Pomeroy	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Investigation must be delayed pending funds & personnel.

HHE 12-24-59

#715 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: Collection of biological material for study of dogfish and skate.

Investigation Title: Dogfish and skate

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators: Port pool personnel and commercial fishermen.

Need for Information: The material is required for research concerned with ageing techniques and proposed fecundity and food studies.

Objective: To obtain required biological material and data for the dogfish-skate investigation.

Method of Procedure:

Phase 1:

Phase 2:

Dogfish - 10
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 3.6

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	0.5
Other Expenses:			
Within Project	--	--	0.2
	--	--	--
Lab. Adm. & Ser.	--	--	2.9
Lab. Total	--	--	3.6
Regional Office			.036
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 63

Recommended by:

	Date
Originator R. L. Edwards	8/6/59
Investigation Chief [redacted]	
Laboratory Director Herbert W. Graham	8/6/59
Regional Director	8/19/59
Branch Chief	

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Investigation must be delayed pending funds & personnel
HHE 12-24-59

#715 7/9/59

INVESTIGATION OF DISEASES AND PARASITES

The role of disease and parasites in limiting the abundance of marine species is a field that has been largely neglected. Dramatic mass mortalities occur from time to time with no obvious explanation. This investigation will make a start at studying the micro- and macro-parasites that infect marine fish and shellfish in our area. It will include a study of parasites as "living tags" in certain populations and be available to make an intensive study of any fish disease problem that may become acute.

August 6, 1959

INVESTIGATION OF DISEASES AND PARASITES

List of Projects

1. Parasites of groundfish
2. Parasites of flounders
3. "Pink Spot" diseases in sea scallops

SUMMARY CO[illegible] OL SCHEDULE

Investigation: **Diseases and Parasites**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Parasites of Groundfish	93.6	-	-	-	-	-	15.2	19.4	19.0	19.1	20.9
2. Parasites of Flounders	94.4	-	-	-	-	-	14.6	19.0	20.5	19.4	20.9
3. "Pink Spot" diseases in Sea Scallops	90.9	-	-	-	-	-	14.6	18.5	18.7	20.8	18.3
Investigation Total	278.9	-	-.	-	-	-	44.4	56.9	58.2	59.3	60.1

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: **J. A. Posgay** Date 8/6/59

Recommended by: Date

Lab. Director **Herbert W. Graham** 8/6/59

Reg. or Area Dir. Joseph P. Connell

Branch Chief

Approved by:

Division Chief for Director

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

#714 7/9/59

Delay Pending funds.
HWG.
Make incidental observations when possible

SEROLOGY INVESTIGATIONS

Justification: Studies done to date have demonstrated that serology is a particularly powerful tool in verifying the existence of stocks within populations of fishes. Much of the work presently under way, designed to indicate the presence and distribution of stocks of fishes within a species, if any, is based on measurable differences in morphology and growth rate, both of which are certainly in part phenotypic expressions of an organism's potential. Serological studies offer verification and identification of stocks on a genetic basis. Since our need is for serological studies as a tool primarily, the projects are based on a species approach in the initial stages.

August 6, 1959

SEROLOGY INVESTIGATION

List of Projects

1. Haddock
2. Flounder, yellowtail
3. Redfish, local populations
4. Redfish, big eye, little eye

SUMMARY (TROL SCHEDULE

Investigation: Serology
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Haddock	52.6	--	--	--	--	15.6	14.0	13.0	10.0	--	--
2. Flounder, yellowtail	55.3	--	--	--	--	15.7	14.0	14.9	10.7	--	--
3. Redfish, local populations	76.5	--	--	--	--	--	6.2	9.8	14.0	23.7	22.8
4. Redfish, big eye, little eye	68.3	--	--	--	--	--	--	8.8	13.0	23.6	22.9
Investigation Total	252.7	--	--	--	--	31.3	34.2	46.5	47.7	47.3	45.7

Annual Review: Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham — 8/6/59

Reg. or Area Dir. Joseph R. Dunn

Branch Chief

Approved by:

Division Chief for Director

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

#714 7/9/59

Delay Pending funds and decision on advisability of starting Serological research at Woods Hole.

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: Serological studies of the Gulf of Maine haddock

Investigation Title: Serology

Investigation Chief: ~~Vacant~~ R. L. Edwards

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The Laboratory research to date has indicated that there are definable stocks of haddock within our area. These conclusions have been reached through an analysis of tag returns and studies of the variations in vertebral number. Serological studies will indicate the genetic level of stock differentiation, and enable a more satisfactory evaluation of the haddock management problems.

Objective: To determine whether or not Gulf of Maine haddock stocks exist as identifiable genetic groups.

Method of Procedure: Standard techniques of serology.

Phase 1:

Phase 2:

Serology - 1 Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 52.6

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	4.5
Other Expenses:			
Within Project	--	--	2.5
	--	--	--
Lab. Adm. & Ser.	--	--	8.6
Lab. Total	--	--	15.6
Regional Office			.156
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	Joseph F. Pomeroy	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Ruling pending funds + decision on advisability of starting serological research at Ward Hall

#715 7/9/59

Hall 12-24-59

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: Serological differences in N. E. yellowtail stocks

Investigation Title: Serology

Investigation Chief: ~~Vacant~~ R. L. Edwards

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Data gathered to date, particularly growth rate data, suggests that there are several more or less distinct stocks of yellowtail flounder in the N. E. area. Since growth rates may be largely determined by environment (be phenotypic), any corroboration through serology studies would be extremely valuable for management purposes.

Objective: To determine whether or not the division of the yellowtail flounder population in stocks on the basis of growth rate differences are valid and genetic rather than phenotypic in nature.

Method of Procedure: Standard serological techniques.

Phase 1:

Phase 2:

Serology - 2
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 55.3

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	4.5
Other Expenses:			
Within Project	--	--	2.5
	--	--	--
Lab. Adm. & Ser.	--	--	8.7
Lab. Total	--	--	15.7
Regional Office			.157
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; 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	Joseph F. Smadel	8/19/59
Branch Chief		

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Ailing pending funds and decision on advisability of studies in undeveloped Research at Naval Stations.

#715 7/9/59

EXPERIMENTAL STUDIES

These studies are concerned with certain problems best studied in the laboratory that will enable better interpretation of data collected from a wild population. The nature of growth and its periodicity in fishes, the factors that cause mortality in larval fish and similar studies will be carried out. The personnel assigned to this group are also concerned with the management of the aquarium. The techniques used in these two studies are similar and the problems related.

August 6, 1959

SUMMARY CO OL SCHEDULE

Investigation: Experimental studies
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Lab techniques for culture of Marine fish	78.4	--	--	--	14.2	10.3	9.4	11.6	9.7	10.6	12.6
2. Rate of ascent of Pelagic eggs	23.7	--	--	--	13.3	10.4	--	--	--	--	--
3. Sustained swimming rate of larval fish	17.3	--	--	--	--	9.1	8.2	--	--	--	--
4. Effect of Temperature on Meristics	29.5	--	--	--	--	--	8.2	11.6	9.7	--	--
5. Effect of Environment of Growth Rate	38.8	--	--	--	--	--	6.9	11.6	9.7	10.6	--
6. Factors influencing Annulus formation	44.5	--	--	--	--	--	--	11.6	9.7	10.6	12.6
7. Studies of behaviour of larval fish	32.2	--	--	--	--	--	--	--	9.7	10.0	12.5
8. Effects of Photo period and temperature on Spawning	20.0	--	--	--	--	--	--	--	--	7.5	12.5
Investigation Total	284.4	--	--	--	27.5	29.8	32.7	46.4	48.5	49.3	50.2

Annual Review			Date
Laboratory	Regional or Area Office	Washington Office	Prepared by: D. Miller 8/6/59
			Recommended by: Date
			Lab. Director Herbert W. Graham 8/6/59
			Reg. or Area Dir. Joseph A. Kinneclay
			Branch Chief 12-24-59
			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: Laboratory techniques for the culture of marine fish

Investigation Title: Experimental studies

Investigation Chief: ~~Vacant~~ Charles Wheeler

Project Leader: Charles Wheeler F. R. B. GS-11
Name Title Grade

Assistants: (Title and Grade)

David Miller F. R. B. GS-9
Vacant, Student assistant GS-4 (Temporary)

Collaborators:

Need for Information: Standard methods for rearing marine fish under laboratory conditions must be developed as a prerequisite to any further experimental work in this general field.

Objective: To develop and standardize techniques for the holding and rearing of commercial species of marine fish, both young and adult.

Method of Procedure:

Phase 1: Through experimentation, determine the necessary gross requirements of space, circulation, temperature, salinity, oxygen, light, and food, essential to the laboratory culture of fish.
From a knowledge of these requirements, set up standard methods of rearing against which various experimental procedures may be tested.

Phase 2: Assemble a bibliography of the literature on the culture of marine fish larvae.
Publish results.

Exp. Studies - 1
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 78.4

	FY 1959	FY 1960	FY 1961
Personal Services	--	5.2	3.6
Other Expenses:			
Within Project	--	0.1	0.9
	--	--	--
Lab. Adm. & Ser.	--	8.9	5.8
Lab. Total	--	14.2	10.3
Regional Office		.142	.103
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	C. L. Wheeler	8/6/59
Investigation Chief	C. L. Wheeler	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph H. Gmuender	8/19/59
Branch Chief	WHE	12-24-59

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Rate of ascent of pelagic eggs in waters of known density

Investigation Title: Experimental studies

Investigation Chief: C. L. Wheeler

Project Leader: To be assigned.
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The time interval between the demersal spawning, and the arrival of pelagic eggs at the surface layers is not known for most species. This information is of value in relating large concentrations of eggs at the surface to the actual spawning areas on the bottom.

Objective: To measure the rate of ascent of the newly spawned pelagic eggs of the more important commercial species.

Method of Procedure:

Phase 1: Develop and construct suitable laboratory apparatus for measuring the ascent of pelagic eggs in waters of varying density. Measure the rate of ascent for the eggs of the species for which this information is lacking. Publish the results.

Phase 2:

Exper. Studies - 2
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.7

	FY 1959	FY 1960	FY 1961
Personnel Services	--	4.3	3.0
Other Expenses:			
Within Project	--	0.1	0.9
	--	--	--
Lab. Adm. & Ser.	--	8.9	6.5
Lab. Total	--	13.3	10.4
Regional Office		.133	.104
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:

		Date
Originator	C. L. Wheeler	8/6/59
Investigation Chief	C. L. Wheeler	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Penkrot	8/19/59
Branch Chief	WHE.	12-24-59

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Determination of sustained swimming rate for larval fish.

Investigation Title: Experimental studies

Investigation Chief: ~~Vacant~~ C. L. Wheeler

Project Leader: To be assigned
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The young of ma ny marine species spend a considerable length of time at the mercy of ocean currents. The time at which they become free of the influence of these currents depends in part upon the rate of development of their swimming ability. Knowledge of the sustained swimming rates for various species would prove valuable in interpreting field observations.

Objective: To determine the net potential for locomotion of larval fish of various ages, and the rate at which this ability increases with increase in age.

Method of Procedure:

Phase 1: Develop new, or adapt existing apparatus for measuring sustained swimming rate of larval fish. Carry out controlled experiments to determine this rate for larvae of varying ages. Compile data and publish results.

Phase 2:

Exp. Studies - 3
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 17.3

	FY 1959	FY 1960	FY 1961
Personnal Services	--	--	2.5
Other Expenses:			
Within Project	--	--	0.9
	--	--	--
Lab. Adm. & Ser.	--	--	5.7
Lab. Total	--	--	9.1
Regional Office			.091
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:

		Date
Originator	C. L. Wheeler	8/6/59
Investigation Chief	C. L. Wheeler	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Penkala	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

#715 7/9/59

DYNAMICS OF FISH POPULATIONS

The use of population models to predict the effect of changes in growth and mortality rates is now a well-established branch of fishery biology. The mathematical skills required to develop, select, and apply these models are, unfortunately, not possessed by all fishery biologists. This unit will keep informed on modern developments in theory, select and develop models for application to species under investigation at this laboratory, and advise the species investigations on population dynamics problems. In addition, it will advise on the proper statistical methods for experimental design and analysis.

August 6, 1959

DYNAMICS OF FISH POPULATIONS

List of Projects

1. Assessment of mesh regulation
2. Growth rates of Georges Bank haddock
3. Population dynamics of cod
4. Population dynamics of redfish
5. Population dynamics of silver hake

SUMMARY CO[illegible]OL SCHEDULE

Investigation: Dynamics of Fish Populations
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Assessment of Mesh Regulation	74.8	6.7	5.8	6.0	3.1	7.2	7.2	9.4	9.4	10.0	10.0
2. Growth Rates of Georges Bank Haddock before & after regu.	74.7	6.5	6.6	5.9	3.0	6.8	7.2	9.3	9.4	10.0	10.0
3. Population Dynamics of Cod Stocks	70.5	6.5	5.6	5.9	3.0	5.6	7.2	8.5	9.6	9.2	9.4
4. Population Dynamics of Redfish Stocks	63.2	3.4	5.6	5.0	3.0	5.6	5.7	9.3	8.6	8.5	8.5
5. Population Dynamics of Silver Hake	60.3	3.3	5.5	5.0	2.0	5.4	5.4	8.3	8.4	8.5	8.5
Investigation Total	343.5	26.4	29.1	27.8	14.1	30.6	32.7	44.8	45.4	46.2	46.4

Annual Review			
Laboratory	Regional or Area Office	Washington Office	
			Prepared by: Date 8/6/59
			Recommended by: Date 8/6/59
			Lab. Director Herbert W. Graham
			Reg. or Area Dir.
			Branch Chief
			Approved by: 12-24-59
			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: Assessment of the effect of the ICNAF mesh regulation on Georges Bank haddock yields

Investigation Title: Dynamics of Fish Populations

Investigation Chief: Vacant

Project Leader: Vacant
Name — Title — Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The Laboratory has a commitment to ICNAF to assess the effect of the present and any future regulation.

Objective: To measure, if possible, the amount of benefit resulting from mesh regulation and to improve upon present statistical technique used in such analyzes.

Method of Procedure: Statistical evaluation and population model studies based on the available haddock data.

Phase 1:

Phase 2:

Dyn Fish Pops - 1
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 74.8

	FY 1959	FY 1960	FY 1961
Personal Services	2.6	3.1	3.5
Other Expenses:			
Within Project	--	--	--
	--	--	--
Lab. Adm. & Ser.	3.4	--	3.7
Lab. Total	6.0	3.1	7.2
Regional Office	.06	.031	.072
Washington Office			
Total			

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

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

Recommended by: Date

Originator

Investigation Chief

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph T. Dunecliff 8/19/59

Branch Chief 2HE 12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Growth Rate of Georges Bank haddock before and after regulation

Investigation Title: Dynamics of Fish Populations

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: It is required for management of the resource.

Objective: To determine the effect of the ICNAF mesh regulation on the growth rate of haddock.

Method of Procedure:

Phase 1: Keep the annual growth rate data of the Georges Bank Haddock stocks under careful review.

Phase 2: Prepare reports.

Dyn Fish Pops - 2
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 74.7

	FY 1959	FY 1960	FY 1961
Personal Services	2.5	3.0	3.2
Other Expenses:			
Within Project	1.9	--	0.1
--	--	--	--
Lab. Adm. & Ser.	1.5	--	3.5
Lab. Total	5.9	3.0	6.8
Regional Office	.059	.03	.068
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator		
Investigation Chief		
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Population Dynamics of Cod Stocks

Investigation Title: Population Dynamics

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: It is required for management of the resource.

Objective: To predict and measure the effect of mesh regulation on cod yields.

Method of Procedure:

Phase 1: Application of population dynamics theory to the cod data

Phase 2: Prepare reports

Dyn Fish Pops - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 70.5

	FY 1959	FY 1960	FY 1961
Personal Services	2.5	3.0	2.0
Other Expenses:			
Within Project	--	--	0.1
	--	--	--
Lab. Adm. & Ser.	3.4	--	3.5
Lab. Total	5.9	3.0	5.6
Regional Office	.059	.03	.056
Washington Office			
Total			

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

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

Recommended by: Date

Originator

Investigation Chief

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph A. Pomeroy 8/19/59

Branch Chief [illegible] 12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Population Dynamics of Redfish Stocks

Investigation Title: Population Dynamics

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Required for management of the resource

Objective: To determine rates of growth, natural and fishing mortalities in order to assess the effects of fishing on redfish stocks.

Method of Procedure:

Phase 1: Calculate parameters from available data and apply population dynamics theory to these data

Phase 2: Write reports on conclusions

Dyn Fish Pops - 4
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 63.2

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	3.0	2.0
Other Expenses:			
Within Project	--	--	0.1
	--	--	--
Lab. Adm. & Ser.	3.0	--	3.5
Lab. Total	5.0	3.0	5.6
Regional Office	.05	.03	.056
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 66+

Recommended by:
Originator _____ Date _____

Investigation Chief _____

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph H. Dingerkus 8/19/59

Branch Chief [illegible] 12-24-59

Approved by:
Division Chief for Director [illegible] 1-4 60

Remarks

(Continue on reverse side)

#715 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: Population Dynamics of Silver Hake

Investigation Title: Population Dynamics

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Required for management of the resource.

Objective: To determine rates of growth, natural and fishing mortalities in order to assess the effects of fishing on silver hake stocks.

Method of Procedure:

Phase 1: Calculate parameters from available data and apply population dynamics theory to these data.

Phase 2: Write reports.

Dyn Fish Pops - 5
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 60.3

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	2.0	2.0
Other Expenses:			
Within Project	--	--	--
	--	--	--
Lab. Adm. & Ser.	3.0	--	3.4
Lab. Total	5.0	2.0	5.4
Regional Office	.05	.02	.054
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 66

Recommended by: Date
Originator _____ _____
Investigation Chief _____
Laboratory Director Herbert W. Graham 8/6/59
Regional Director Joseph F. Passmore 8/19/59
Branch Chief _____ 12-24-59
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

ESTUARINE STUDIES

It has only recently become apparent that in addition to supplying a complete habitat for such marine resources as oysters, clams, crabs, and bay scallops, estuaries act as important nursery grounds for many species of marine fish that are later harvested offshore. These environments are under continuous heavy pressure by such activities as diking, dredging filling, and pollution without much knowledge as to their eventual effects. It is necessary that we begin a study of "natural" estuaries and "modified" estuaries so that knowledge of the effects of various modifications will be available. This will provide a rational basis for judging the relative values of various competing uses of estuaries and marine wetlands.

August 6, 1959

ESTUARINE STUDIES

List of Projects

1. The dominant invertebrate fauna of estuaries and embayments, its distribution and abundance, and relation to hydrography.
2. Distribution of bottom invertebrates
3. Species composition and abundance of larval fish in Narragansett Bay

SUMMARY CONTROL SCHEDULE

Investigation: Estuarine Studies
Biological Laboratory: Woods Hole, Massachusetts

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. The dominant invertebrate fauna of estuaries and embayments, its distribution and abundance, and relation to hydrography	40.8	--	--	--	--	--	--	17.3	11.7	11.8	--
2. Distribution of bottom invertebrates	41.7							17.3	12.6	11.8	--
3. Species composition and abundance of larval fish in Narragansett Bay	58.1							--	11.7	12.8	33.6
Investigation Total	140.6	--	--	--	--	--	--	34.6	36.0	36.4	33.6

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: Robert L. Edwards — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir. Joseph J. Pennucci

Branch Chief [illegible]

Approved by:

Division Chief for Director

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

#714 7/9/59

Noted for future Planning
Will depend on funds & Personnel

GENETICS

The genetics of marine fishes is an almost totally unexplored field. Fish genetics has been restricted to aquarium fishes and those commonly raised in hatcheries. The techniques and results of these studies should be transferred to the marine field. Temperature tolerance and resistance to disease are known to be genetically determined. The degree to which the meristic traits used to separate geographical races are inherited should be investigated, as well as the possibility the growth rates may have subject to genetic variation.

August 6, 1959

GENETICS

List of Projects

1. Genetic determination of the metameric characters of the haddock
2. Genatypic variation in growth rates of groundfish
3. Chromosomal differences in sympatric species

SUMMARY CONTROL SCHEDULE

Investigation: Genetic Studies
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Genetic determination of the metameric characters of the haddock	90.4	--	--	--	--	--	28.9	20.1	13.7	13.8	13.9
2. Genatypic variation in growth rates of groundfish	73.4	--	--	--	--	--	--	21.8	17.0	17.1	17.5
3. Chromosomal differences in sympatric species	46.4	--	--	--	--	--	--	--	14.8	15.8	15.8
Investigation Total	210.2						28.9	41.9	45.5	46.7	47.2

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham 8/6/59

Reg. or Area Dir. Joseph T. Dunnethan

Branch Chief

Approved by:

Division Chief for Director

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

#714 7/9/59

Delay pending funds
Personnel

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

SUMMARY CONTROL SCHEDULE

Investigation: Physiology
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Oxygen consumption of various groundfish species	34.5	---	---	---	---	13.6	10.7	10.2	---	---	---
2. Oxygen consumption changes with size change	35.2	---	---	---	---	13.7	11.1	10.4	---	---	---
3. Metabolic and food intake	68.1	---	---	---	---	---	10.7	10.4	20.7	12.9	13.4
4. Role of environment factors on spawning	57.3	---	---	---	---	---	---	9.9	20.7	13.3	13.4
5. Rose of environment factors on aggregation	27.3	---	---	---	---	---	---	---	---	13.8	13.5
Investigation Total	222.4	---	---	---	---	27.3	32.5	40.9	41.4	40.0	40.3

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: R. L. Edwards 8/6/59

Recommended by: Date

Lab. Director Herbert W. Graham

Reg. or Area Dir. Joseph A. Pierce for Elan

Branch Chief

Approved by:

Division Chief for Director

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

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

#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: The seasonal O_2 consumption of various groundfish species

Investigation Title: Physiology

Investigation Chief: R. L. Edwards

Project Leader: Vacant
Name Title Grade

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 Q_{10}'s for various temperatures at various seasons.

Phase 2:

Physiol - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 34.5

	FY 1959	FY 1960	FY 1961
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:

		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	Joseph F. Dimmette	8/19/59
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 special investigations.

#715 7/9/59 HHE 12-24-59

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: O_2 Consumption changes with changes in Mass

Investigation Title: Physiology

Investigation Chief: R. L. Edwards

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: O_2 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_2 consumption and the O_{10} 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 35.2

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	2.5
Other Expenses:			
Within Project	--	--	2.5
	--	--	--
Lab. Adm. & Ser.	--	--	8.7
Lab. Total	--	--	13.7
Regional Office			.137
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:

		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	Joseph F. Demmerle	8/19/59
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 investigation. JHE 12-24-59

#715 7/9/59

FISH BEHAVIOR

All fishing practices depend upon some knowledge of the behavior of the particular species being sought. This knowledge is now mainly a collection of observations of fishermen and naturalists over the centuries. It is long past time that a serious quantitative investigation be made of the factors which influence aggregation, vertical distribution, seasonal migration, feeding cycles, changes in availability, escape from gear, and other aspects of the behavior of fishes.

August 6, 1959

SUMMARY CO[illegible]OL SCHEDULE

Investigation: Fish Behavior
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Film - Groundfish in otter trawls	40.2	16.2	24.0	-	-	-	-	-	-	-	-
2. Behavior of groundfish in otter trawls	23.6	-	-	12.2	11.4	-	-	-	-	-	-
3. Depth-temperature recorder	21.8	-	-	10.3	11.5	-	-	-	-	-	-
4. Orientation of bottom fish to current and light	110.4	-	-	-	-	8.0	9.2	13.3	39.7	40.2	-
5. Diurnal migrations of scup and butterfish	30.7	-	-	-	-	8.1	9.4	13.2	-	-	-
6. Development of techniques for study of swim. ability	30.4	-	-	-	-	8.0	9.2	13.2	-	-	-
Investigation Total	257.1	16.2	24.0	22.5	22.9	24.1	27.8	39.7	39.7	40.2	-

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Robert Livingstone — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — 8/6/59

Reg. or Area Dir. Joseph A. Pennachio

Branch Chief [illegible] 12-24-59

Approved by: [illegible]
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: The behavior of groundfish in the cod end of otter trawls.

Investigation Title: Fish Behavior

Investigation Chief: R. Livingstone, Jr.

Project Leader: R. Livingstone, Jr., Fishery Research Biologist GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Gear selection experiments have shown differential escapement for different sizes of fish. From variations in these escapement experiments it is plain that escapement is not an active directed behavior. Observations are needed as to the mechanism of escape.

Objective: To determine the factors effecting the escapement of different species of groundfish.

Method of Procedure: UWTV in cod end. Observe reactions of fish to towing speed, size of catch, species composition, etc. Completed.

Phase 1: To analyze films of monitor, record and describe behavior.

Phase 2:

Fish Behavior - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.6

	FY 1959	FY 1960	FY 1961
Personal Services	3.8	2.8	--
Other Expenses:			
Within Project	0.3	0.1	--
Lab. Adm. & Ser.	8.1	8.5	--
Lab. Total	12.2	11.4	--
Regional Office	.122	.114	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	**R. L. Livingstone, Jr.**	8/6/59
Investigation Chief	Robert Livingstone, Jr.	8/6/59
Laboratory Director	Herbert L. Graham	8/6/59
Regional Director	Joseph A. Dunn for Ran	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Depth-temperature for use with underwater television systems.

Investigation Title: Fish Behavior

Investigation Chief: R. Livingstone, Jr.

Project Leader: R. Livingstone, Jr. Fishery Research Biologist GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: In order to evaluate the activities of fish in a trawl net or in the environment, it is necessary to consider temperatures, depths, currents, etc. Instrumentation needed to be developed for measuring these variables in conjunction with visual TV observations, the usefulness of UTV would be greatly increased.

Objective: To develop instruments for measuring temperature, depth, current, etc., in conjunction with UTV observations.

Method of Procedure:

Phase 1: To present the idea to WHOI and enlist their services to design and fabricate a single conductor telemeter that would transmit temperature and depth information through the television cable.

Phase 2: Test under field conditions.

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 21.8

	FY 1959	FY 1960	FY 1961
Personnel Services	2.0	2.8	--
Other Expenses: Within Project	0.2	0.1	--
Lab. Adm. & Ser.	8.1	8.6	--
Lab. Total	10.3	11.5	--
Regional Office	.103	.115	
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	R. L. Livingstone, Jr	8/6/59
Investigation Chief	Robert Livingstone, Jr.	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Orientation of bottom fish with reference to a current and light.

Investigation Title: Fish Behavior

Investigation Chief: R. Livingstone, Jr.

Project Leader: R. Livingstone, Jr. Fishery Research Biologist GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Many species of groundfish have been observed to orient upstream in the cod end of otter trawls. If facing into the current is common also in nature, then one would expect wide variations in the catch of groundfish in short intervals of space and time. Observations on orientations to a current are necessary in order to understand this behavior and more fully appreciate efficiency of gear.

Objective: To determine if bottomfish orient with reference to tidal and other currents, light, etc.

Method of Procedure: Observations of behavior and orientation of groundfish in the laboratory followed by experiments in the field using TV
Phase 1: and/or divers.

Phase 2:

Fish Behavior - 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 110.4

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	1.9
Other Expenses:			
Within Project	--	--	0.3
Lab. Adm. & Ser.	--	--	5.8
Lab. Total	--	--	8.0
Regional Office			.08
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61 ; Phase 2 FY ; Phase 3 FY ; Project FY 65

Recommended by:

		Date
Originator	R. L. Livingston, Jr.	8/6/59
Investigation Chief	Robert Livingstone, Jr.	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph H. Pennycuick	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Diurnal Migrations of: (scup, butterfish, hakes)

Investigation Title: Fish Behavior

Investigation Chief: R. Livingstone, Jr.

Project Leader: R. Livingston, Jr. Fishery Research Biologist GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Commercial fishermen have learned to adjust their fishing to habits in accord with the diurnal changes in availability of fish. Fishery biologists know little about the mechanism of diurnal behavior in fishes. A study of the factors involved would be of great us to the New England fishing industry which is currently interested in the possibility of midwater fisheries.

Objective: To investigate the factors governing the diurnal behavior of scup, etc.

Method of Procedure:

Phase 1: To observe by means of remote UTV the behavior of scup, etc., in an enclosure at intervals over a 24 hour period. Record changes in orientation and behavior (currents, rate of swimming, feeding behavior, schooling, etc.)

Phase 2: Attempt a similar series of observations on a larger scale in the field using echo sounding, TV and mid water trawls.

Fish Behavior - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 30.7

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	2.0
Other Expenses:			
Within Project	--	--	0.4
Lab. Adm. & Ser.	--	--	5.7
Lab. Total	--	--	8.1
Regional Office			.081
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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. Livingstone, Jr.	8/6/59
Investigation Chief	Robert Livingstone, Jr.	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Penoyer	8/19/59
Branch Chief	[illegible]	12-24-57

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Experimental apparatus for testing swimming speed for haddock and other groundfish.

Investigation Title: Fish Behavior

Investigation Chief: R. Livingstone, Jr.

Project Leader: R. Livingstone, Jr. Fishery Research Biologist GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Research with television in trawl nets has shown that the speed of the net over the bottom has a pronounced effect on the resultant activities of fish in the cod end. Facilities for holding groundfish and for testing their swimming abilities must be devised before a quantitative appraisal can be made of the effect of towing speed on mechanism of escapement.

Objective: To develop apparatus for measuring swimming speed of groundfish.

Method of Procedure:
Phase 1: Design and test experimental apparatus in laboratory or field such as fish wheel, flume, TV rheotaxis cage, etc. Test fish of various sizes and observe their reactions to experimental apparatus.

Phase 2:

~~FOOD~~ BEHAVIOR - 6

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 30.4

	FY 1959	FY 1960	FY 1961
Personal Services			1.9
Other Expenses:			
Within Project			0.3
Lab. Adm. & Ser.			5.8
Lab. Total			8.0
Regional Office			.08
Washington Office			
Total			

Recommended Source of Funds **S-K and Regular**
(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	**Robert Livingstone, Jr.**	8/6/59
Investigation Chief	Robert Livingstone, Jr.	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Rinaldo	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 7/9/59

SEA SCALLOP INVESTIGATIONS

The sea scallop fishery has been expanding rapidly since 1945 and is now the most valuable of the New England offshore fisheries. Pressure on the Georges Bank stocks has also increased recently with the expansion of the Canadian offshore sea scallop fleet.

When the present investigation was started, there was very little known of the biology of the animal or of the condition of the exploited stocks. We now have good estimates of growth and mortality rates in the catchable sizes and programs set up to measure the removals and evaluate the effects of changes in fishing practice. There is evidence that the older year-classes of larger animals have been fished out and that the fishery is heavily dependent upon the smallest catchable year-class. Population dynamics calculations indicate an increase in yield will result from a postponement of first capture, and a management program is being considered.

Nothing is known about the sea scallop from the time the eggs are spawned until they reach about 10 mm. and very little from this size to about 60 mm. It is during this period that the physical and biological environment presses most heavily on the stocks. Future expansion of this investigation will be concerned with these stages of the life history.

August 6, 1959

SEA SCALLOP INVESTIGATIONS

List of Projects

1. Basic statistics
2. Sampling at sea
3. Survey of grounds
4. Strength of pre-recruits
5. Growth from tags
6. Shell structure
7. Growth from rings
8. Total mortality from L-F
9. Fishery mortality from tags
10. Natural mortality
11. Mesh selection
12. Population dynamics
13. Aquarium
14. Ring formation
15. Gametogenesis
16. Spat collection
17. Variation in length-weight ratio
18. Larval culture
19. Temperature on larvae
20. Temperature on adult growth

21. Food on larvae
22. Vertical distribution of larvae
23. Salinity on growth
24. Food of adults
25. Survey of immature
26. Formation of beds
27. Predators
28. Hydrography and year-class strength
29. Middle Atlantic beds

SUMMARY CONTROL SCHEDULE

Investigation: Sea Scallops
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years									
		57	58	59	60	61	62	63	64	65	66
1. Basic statistics of the sea scallop fishery	78.8	11.0	7.9	6.1	7.5	7.1	8.4	6.7	7.0	7.0	10.1
2. Sampling the commercial catch at sea	68.7	9.2	5.0	5.1	6.1	6.4	7.9	6.2	6.5	6.7	9.6
3. Survey of the sea scallop grounds	157.1	14.9	10.3	9.4	12.7	17.0	18.1	17.2	17.5	18.6	21.4
4. Strength of pre-recruit year class	34.6	--	--	3.0	4.1	4.1	5.4	3.6	3.9	3.9	6.6
5. Growth from tag returns	27.5	8.4	6.9	6.1	6.1	--	--	--	--	--	--
6. Structure and formation of the shell ligament	14.3	--	6.8	4.4	3.6	--	--	--	--	--	--
7. Growth from rings	53.9	--	--	4.1	6.8	6.4	7.9	6.1	6.5	6.6	9.5
8. Total mortality from L-F distribution analysis	34.8	--	--	3.0	4.1	4.2	5.3	3.6	3.9	4.0	6.7
9. Fishery mortality from tag returns	25.7	--	5.6	3.7	4.8	5.2	6.4	--	--	--	--
10. Natural mortality rate	30.8	--	--	2.5	3.6	3.7	4.8	3.1	3.4	3.5	6.2
11. Size selection of sea scallop dredges	16.9	--	5.2	3.0	4.1	4.6	--	--	---	--	--
12. Population dynamics of G.B. sea scallop fishery	26.9	8.4	5.9	4.0	4.1	4.5	--	--	--	--	--
13. Design and construction of temperature-controlled experimental tank	3.5	--	--	3.5	--	--	---	--	--	--	--
14. Ring formation	11.8	--	--	3.5	4.2	4.1	--	--	--	--	--
15. Gametogenesis and spawning seasonal cycles	8.3	--	--	--	4.2	4.1	--	--	--	--	--

SUMMARY CO. .OL SCHEDULE

Investigation: Sea Scallops
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
16. Spat collection	13.5	--	--	2.7	5.0	5.8	--	--	--	--	--
17. Variation in length-weight ratio by season and area	14.4	--	--	--	4.2	4.5	5.7	--	--	--	--
18. Larval culture	8.9	--	--	--	4.4	4.5	--	--	--	--	--
19. Temperature effect upon larval mortality and growth rates	21.1	--	--	--	--	7.5	7.9	5.7	--	--	--
20. Temperature on adult growth	20.0	--	--	--	--	--	7.9	5.9	6.2	--	--
21. Food on larvae	22.7	--	--	--	--	--	8.9	6.9	6.9	--	--
22. Vertical distribution of larvae	23.5	--	--	--	--	8.2	8.9	6.4	--	--	--
23. Salinity on growth	15.8	--	--	--	--	--	8.9	6.9	--	--	--
24. Food of adults	21.2	--	--	--	--	--	--	6.9	7.1	7.2	--
25. Survey of immature	37.7	--	--	--	--	--	--	--	10.6	11.7	15.4
26. Formation of beds	15.3	--	--	--	--	--	--	--	--	6.4	8.9
27. Predators	15.9	--	--	--	--	--	--	--	--	6.5	9.4
28. Hydrography and year-class strength	28.6	--	--	--	--	--	--	--	8.5	8.7	11.4
29. Middle Atlantic beds	11.0	--	--	--	--	--	--	--	--	--	11.0
Investigation Total	863.7	51.9	53.6	64.1	89.6	101.9	112.4	85.2	88.0	90.8	126.2

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: J. A. Posgay — Date 8/6/59

Recommended by:

Lab. Director Herbert W. Graham — Date 8/6/59

Reg. or Area Dir. Joseph [illegible]

Branch Chief [illegible] 12-24-59

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: Basic statistics of the Sea Scallop Fishery

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: F. E. Nichy (Name) Fishery Research Biologist (Title) GS-7 (Grade)

Assistants: (Title and Grade)
Vacant - Statistical Clerk GS-4

Collaborators:

Need for Information: To keep the state of the fishery under continuous review in order to become aware of any changes in location and abundance.

Objective: To measure the removals in number and weight from all the fishing grounds.

Method of Procedure:

Phase 1: Compile data on catch and effort by unit area on punch cards. Prepare monthly, quarterly and annual summaries. Compile and tabulate data on size and age composition of the landings. Calculate the numbers removed.

Phase 2:

Sea Scallop - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 78.8

	FY 1959	FY 1960	FY 1961
Personal Services	3.8	3.7	3.8
Other Expenses: Within Project	0.2	0.2	0.2
Lab. Adm. & Ser.	2.1	3.6	3.1
Lab. Total	6.1	7.5	7.1
Regional Office	.061	.075	.071
Washington Office			
Total			

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

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

Recommended by:		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Pruitt for HWG.	8/19/59
Branch Chief		12-24-59.
Approved by:		
Division Chief for Director		

Remarks

(Continue on reverse side)

This looks like a data collection - (continuing) project

#715 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: Sampling the commercial catch at sea

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: F. E. Nichy (Name) Fishery Research Biologist (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Vacant - Statistical Clerk GS-4

Collaborators: Various commercial fishermen

Need for Information: The cull point, as well as the kind and amount of discard under various conditions, must be known to predict the effect of any management recommendation.

Objective: To measure the L-F of the catch, discards and landings under the conditions of normal commercial practice.

Method of Procedure:

Phase 1: To send observers aboard commercial scallopers fishing with standard gear as well as experimental gear. To have fishermen bring in special collections of scallops taken with dredge liners and with standard gear.

Phase 2:

Sea Scallop - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 68.7

	FY 1959	FY 1960	FY 1961
Personal Services	2.5	2.5	2.7
Other Expenses: Within Project	0.5	0.5	0.6
Lab. Adm. & Ser.	2.1	3.1	3.1
Lab. Total	5.1	6.1	6.4
Regional Office	.051	.061	.064
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

This looks like a data collection project. Should be continuing.

#715 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: Survey of the Sea Scallop grounds

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. S. Merrill Fishery Research Biologist GS-7
F. E. Nichy Fishery Research Biologist GS-7

Collaborators:

Need for Information: To provide the data necessary for calculating the strength of pre-recruit and exploited year classes, natural and fishing mortality rates.

Objective: To collect length and age frequency data from the fishing grounds with standard and experimental gear.

Method of Procedure:

Phase 1: To make three regularly scheduled sampling cruises each year aboard a chartered fishing vessel:

May	10 days
July	7 days
September	10 days

Phase 2:

Sea Scallop - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 157.1

	FY 1959	FY 1960	FY 1961
Personal Services	1.4	1.6	2.9
Other Expenses: Within Project	6.0	8.0	11.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	9.4	12.7	17.0
Regional Office	.094	.127	.17
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pearson Jr.	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

Data collection ?

#715 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: Strength of the pre-recruit year class

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. S. Merrill Fishery Research Biologist GS-7
F. E. Nichy Fishery Research Biologist GS-7

Collaborators:

Need for Information: To predict the future supply of the resource which will be available to the fishery.

Objective: To predict the relative strength of the incoming year class at least one year before it enters the fishery.

Method of Procedure:

Phase 1: Sample the area at regular intervals with standard, small mesh gear. Compare strengths of successive year classes. Measure yields after they enter the fishery. Make predictions.

Phase 2:

Sea Scallop -4
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 34.6

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.0
Other Expenses: Within Project			
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.0	4.1	4.1
Regional Office	.03	.041	.041
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 ___

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Dunbrack PROGRAM	8/19/59
Branch Chief	HHE.	12-24-59

Approved by:

Division Chief for Director		

Remarks

(Continue on reverse side)

Data collection?

#715 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: Growth rate from tag returns

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: F. E. Nichy (Name) Fishery Research Biologist (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Vacant - Statistical Clerk GS-4

Collaborators:

Need for Information: One of the basic parameters necessary for assessing the effects of fishing on the stocks.

Objective: To determine the annual growth rate in the most important fishing grounds. Validate the annual ring method.

Method of Procedure:

Phase 1: Tag and release large numbers of sea scallops. Measure the growth increment on the recaptured specimens and calculate the annual rates for each area.

Phase 2:

Sea Scallop - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 27.5

	FY 1959	FY 1960	FY 1961
Personal Services	2.5	1.4	--
Other Expenses: Within Project	1.6	0.6	--
Lab. Adm. & Ser.	2.0	4.1	--
Lab. Total	6.1	6.1	
Regional Office	.061	.061	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY ; Phase 2 FY ; Phase 3 FY ; Project FY60

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Passmore	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Structure and formation of the shell ligament

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: A. S. Merrill (Name) Fishery Research Biologist (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Vacant - Fishery Aid GS-4

Collaborators:

Need for Information: A technique for determining the age of an individual scallop is necessary for establishing growth rates and year class strengths of the various fishing grounds.

Objective: To establish the presence, cause and time of formation of marks caused by annual phenomena

Method of Procedure: Sectioning and examination of the shells and ligaments of annuals collected at various times and places.

Phase 1:

Phase 2:

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 14.8

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	0.5	---
Other Expenses: Within Project	0.4	--	--
Lab. Adm. & Ser.	2.0	3.1	--
Lab. Total	4.4	3.6	--
Regional Office	.044	.036	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY58 ; Phase 2 FY ; Phase 3 FY ; Project FY 60

Recommended by:

		Date
Originator	J.A.Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph E. Penner Jr.	8/19/59
Branch Chief	noted	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Growth rate from annual rings

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: A. S. Merrill (Name) Fishery Research Biologist (Title) GS-7 (Grade)

Assistants: (Title and Grade)
Vacant - Fishery Aid GS-4 (Part time)

Collaborators:

Need for Information: One of the basic parameters necessary for assessing the effect of fishing on the stocks.

Objective: To determine the average annual growth rate of the sea scallop throughout its range.

Method of Procedure:

Phase 1: Collect samples of shells, locate the annual rings, measure the growth increments between rings, calculate the average growth rate.

Phase 2:

Sea Scallop-7
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 53.9

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	3.0	3.1
Other Expenses: Within Project	0.1	0.2	0.2
Lab. Adm. & Ser.	2.0	3.6	3.1
Lab. Total	4.1	6.8	6.4
Regional Office	.041	.068	.064
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

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph J. Pomeroy	8/19/59
Branch Chief	2d HE	12-24-59

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

please check completion schedule.

#715 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: Total mortality rate from analysis of L-F distribution

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: F. E. Nichy (Name) Fishery Research Biologist (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Vacant - Fishery Research Biologist GS-7
Vacant - Fishery Aid GS-4 (At Sea)

Collaborators:

Need for Information: One of the basic parameters necessary for assessing the effect of fishing on the stocks.

Objective: To determine the rate of fishing mortality that is generated by any given amount of fishing effort.

Method of Procedure:

Phase 1: Collect serial samples from the fishing grounds and determine relative abundance of the year classes present. Relate the decline in abundance of the exploited year classes to the amount of fishing effort expended on them and their natural mortality rate.

Phase 2:

Sea Scallop - 8

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 34.8

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.1
Other Expenses: Within Project	--	--	--
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.0	4.1	4.2
Regional Office	.03	.041	.042
Washington Office			
Total			

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

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

Recommended by:		Date
Originator	L. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Penniston	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director		

Remarks

(Continue on reverse side)

#715 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: Fishing mortality rate from tag returns

Investigation Title: Sea Scallops

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

Vacant - Fishery Research Biologist GS-7
Vacant - Fishery Research Biologist GS-7 (At Sea)
Vacant - Fishery Aid GS-4

Collaborators:

Need for Information: One of the basic parameters necessary for assessing the effect of fishing on the stocks.

Objective: To determine the rate of fishing mortality that is generated by any given amount of fishing effort.

Method of Procedure:

Phase 1: Tag and release large numbers of sea scallops. Record recaptures and effort expended in the area. Calculate fishing mortality rate.

Phase 2:

Sea Scallop - 9
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 25.7

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.1
Other Expenses: Within Project	0.7	0.7	1.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.7	4.8	5.2
Regional Office	.037	.048	.052
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY58 ; Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. POSGAY	8/6/59
Laboratory Director	HERBERT W. GRAHAM	8/6/59
Regional Director	Joseph H. Penniman	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Natural Mortality Rate

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

Vacant - Fishery Research Biologist GS-7
Vacant - Fishery Research Biologist GS-7 (At Sea)
Vacant - Fishery Aid GS-4

Collaborators:

Need for Information: One of the basic parameters necessary for assessing the effort of fishing on the stocks.

Objective: To determine the average annual rate of mortality of the sizes in and above the selection range of the gear from causes other than fishing.

Method of Procedure:

Phase 1: Count the ratio of clapper shells to live scallops on all important fishing grounds. Calculate the natural mortality rate. Monitor these rates from year to year.

Phase 2:

Sea Scallop -10
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 30.8

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	0.5	0.6
Other Expenses: Within Project	--	--	--
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	2.5	3.6	3.7
Regional Office	.025	.036	.037
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pruter	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:
Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Size selection of sea scallop dredges

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

Vacant - Fishery Research Biologist GS-7
Vacant - Fishery Research Biologist GS-7
Vacant - Statistical Clerk GS-4

Collaborators:

Need for Information: Any management recommendations for this fishery will probably take the form of controlling the size at first capture by specifying a minimum mesh size.

Objective: To measure the 50% selection point of dredges made up of various sizes ofrings and links.

Method of Procedure:

Phase 1: Make simultaneous tows of dredges with standard and experimental mesh sizes. Record length-frequencies of the catch of each dredge. Calculate selection points.

Phase 2:

Sea Scallop - 11

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 16.9

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	0.5	0.5
Other Expenses: Within Project	--	0.5	1.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.0	4.1	4.6
Regional Office	.03	.041	.046
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Dunleavy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Population dynamics of G. B. Sea Scallop Fishery

Investigation Title: Sea Scallops

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

Vacant - Fishery Aid GS-4
Vacant - Fishery Research Biologist GS-7
Vacant - Fishery Research Biologist GS-7

Collaborators:

Need for Information: To make possible recommendations for management of this fishery.

Objective: To determine the optimum age at first capture and/or fishing effort and predict the effect of changes in these factors.

Method of Procedure:

Phase 1: Combine data on rates of growth, natural mortality, and fishing mortality with data on catch and effort into a population model. Make recommendations for management.

Phase 2:

Sea Scallop - 12
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 26.9

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	1.0	1.5
Other Expenses: Within Project	---	--	--
Lab. Adm. & Ser.	2.0	3.1	3.0
Lab. Total	4.0	4.1	4.5
Regional Office	.04	.041	.045
Washington Office			
Total			

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

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

Recommended by:
Originator J. A. Posgay 8/6/59 Date

Investigation Chief J. A. Posgay 8/6/59

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph G. Peterson 8/19/59

Branch Chief [illegible] 12-24-59

Approved by:
Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Design and construction of temperature-controlled experimental tank.

Investigation Title: Scallops

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay, Fishery Research Biologist, GS-12
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: In order to perform various experimental programs in the new laboratory, a reasonably portable temperature controlled tank is needed. This tank should be relatively inexpensive and easily constructed on the premises.

Objective: To design, build and test a laboratory experimental tank with temperature control.

Method of Procedure:

Phase 1: Design tank
Build and test design.

Phase 2:

Sea Scallop-13

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 3.5

	FY 59	FY	FY
Personal Services	0.5	--	--
Other Expenses: Within Project	1.0	--	--
Lab. Adm. & Ser.	2.0	--	--
Lab. Total	3.5	--	--
Regional Office	.035		
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Dunnigan	8/19/59
Branch Chief	Noted.	HHE.

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

Publication not a known project

#715 7/9/59

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

Sheet No. 1

Location: Woods Hole, Mass.
Date: August 11, 1959
File No.

Research Project Outline

Title of Project: Time and Cause of formation of annual ring.

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: A. S. Merrill — Fishery Research Biologist — GS-7
(Name — Title — Grade)

Assistants: (Title and Grade)

F. E. Nichy Fishery Research Biologist GS-7

Collaborators:

Need for Information: Annual rings are used in age and growth studies but the time and cause of the ring, which may be different in different areas or years, is not known.

Objective: To determine the time and cause of the formation of annual rings.

Method of Procedure:

Phase 1: Collect monthly samples from as many areas as possible.
Observe when the ring forms.
Correlate the time with environmental factors.
Attempt to reproduce rings in aquaria.

Phase 2:

Sea Scallop-14
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 11.8

	FY 1959	FY 1960	FY 1961
Personal Services	1.0	1.0	1.0
Other Expenses: Within Project	0.5	0.1	0.1
Lab. Adm. & Ser.	2.0	3.1	3.0
Lab. Total	3.5	4.2	4.1
Regional Office	.035	.042	.041
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Dempsey Acting	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: Seasonal cycle of gametogenisis and spawning

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) F. R. B. (Title) GS-12 (Grade)

Assistants: (Title and Grade)

A. S. Merrill F. R. B. GS-7
F. E. Nichy F. R. B. GS-7

Collaborators:

Need for Information: Many of the conclusions about sea scallops biology and the fishery depend upon the assumption of a single, main spawning season.

Objective: To determine the time and causes of spawning.

Method of Procedure:

Phase 1: Collect monthly samples from as many areas as possible. Conduct histological examination of the gonads. Correlate observed changes with environmental factors.

Phase 2:

Sea Scallop - 15
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 8.3

	FY 1959	FY 1960	FY 1961
Personal Services	--	1.0	1.0
Other Expenses:			
Within Project	--	0.1	0.1
Lab. Adm. & Ser.	--	3.1	3.0
Lab. Total	--	4.2	4.1
Regional Office		.042	.041
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	SIGNED: JOSEPH F. PUNCOCHAR	8/19/59
Branch Chief	ZHE.	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Collection of spat.

Investigation Title: Sea Scallops

Investigation Chief: J. A. Posgay

Project Leader:	A. S. Merrill	FRB	GS-7
	Name	Title	Grade

Assistants: (Title and Grade)

F. E. Nichy	FRB	GS-7

Collaborators:

Need for Information: Nothing is known about how or where sea scallops less than one inch maintain themselves.

Objective: To determine the time and place that sea scallops leave the plankton.

Method of Procedure:

Phase 1: Set out spat collectors, inspect at intervals during the year. Inspect the fouling organisms on navigation buoys for newly set sea scallop spat.

Phase 2:

Sea Scallop-16
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 13.5

	FY 1959	FY 1960	FY 1961
Personal Services	0.2	1.5	1.5
Other Expenses: Within Project	0.5	0.5	1.3
Lab. Adm. & Ser.	2.0	3.0	3.0
Lab. Total	2.7	5.0	5.8
Regional Office	.027	.05	.058
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Quinn	8/19/59
Branch Chief	24E	12-24-59

Approved by:

Division Chief for Director		

Remarks

(Continue on reverse side)

#715 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: Seasonal and areal variation in the length-weight ratio

Investigation Title: Sea Scallops

Investigation Chief: J. A. Posgay

Project Leader: F. E. Nichy (Name) FRB (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: Growth rates are measured in terms of increase in length but population dynamics calculations are made in terms of growth in weight calculated from the average L-W ratio. If this ratio varies from season to season, or place to place, it can seriously affect the predictions of benefit.

Objective: To measure the seasonal variation in the L-W ratio at several locations.

Method of Procedure:
Phase 1: Collect samples at regular intervals from selected locations. Measure lengths, weigh meats, calculate L-W ratios, compare ratios seasonally and by area.

Phase 2:

Sea Scallop -17
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 14.4

	FY 1959	FY 1960	FY 1961
Personal Services	--	1.0	1.0
Other Expenses:			
Within Project	--	0.2	0.5
Lab. Adm. & Ser.	--	3.0	3.0
Lab. Total	--	4.2	4.5
Regional Office		.042	.045
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY60 ; Phase 2 FY ; Phase 3 FY ; Project FY62

		Date
Recommended by:		
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59
Approved by:		
Division Chief for Director	[illegible]	

Remarks

(Continue on reverse side)

#715 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: Culture of Larvae

Investigation Title: Sea Scallops

Investigation Chief: J. A. Posgay

Project Leader:	J. A. Posgay	FRB	GS-12
	Name	Title	Grade

Assistants: (Title and Grade)

F. E. Nichy	FRB	GS-7
A. S. Merrill	FRB	GS-7

Collaborators:

Need for Information: Nothing is known about the first years of life from egg fertilization to the formation of beds.

Objective: To develop a technique for maintaining cultures of sea scallop larvae for experiments on survival and growth.

Method of Procedure:

Phase 1: Set up cultures of phyto plankton which have proved to be suitable foods for polycepoel larvae. Induce spawning in ripe scallops.

Phase 2:

Sea Scallop - 18
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 8.9

	FY 1959	FY 1960	FY 1961
Personal Services		1.0	1.0
Other Expenses: Within Project		0.4	0.5
Lab. Adm. & Ser.	--	3.0	3.0
Lab. Total	--	4.4	4.5
Regional Office		.044	.045
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60; Phase 2 FY ; Phase 3 FY ; Project FY 61

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph E. Spencer Lee	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: The effect of temperature upon larval mortality & growth rates.

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

F. E. Nichy - Fishery Research Biologist GS-7
A. S. Merrill - Fishery Research Biologist GS-7

Collaborators:

Need for Information: Once the environmental factors which affect survival and growth are known, it may be possible to predict the success of any year-class from a knowledge of the condition of the environment at the time of spawning.

Objective: To determine the optimum temperature for survival and growth of the pelagic larvae.

Method of Procedure:

Phase 1: Set up controlled experiments to establish the optimum temperature, measure the effect on survival and growth of departures from this optimum.

Phase 2:

Sea Scallop - 19
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 21.1

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	2.5
Other Expenses: Within Project	--	--	2.0
Lab. Adm. & Ser.	--	--	3.0
Lab. Total	--	--	7.5
Regional Office			.075
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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	J. A. Posgay	8/ 6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Dunn Jay	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:
Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Vertical distribution of the pelagic larvae

Investigation Title: Sea Scallop

Investigation Chief: J. A. Posgay

Project Leader: J. A. Posgay (Name) Fishery Research Biologist (Title) GS-12 (Grade)

Assistants: (Title and Grade)

F. E. Nichy - Fishery Research Biologist GS-7
A. S. Merrill - Fishery Research Biologist GS-7

Collaborators:

Need for Information: The sea scallop is known to have a pelagic larval stage, but they have never been collected from the plankton.

Objective: To determine at what level in the water column one can expect to find the pelagic stages.

Method of Procedure:

Phase 1: Maintain larval cultures at various conditions of temperature, salinity, light and turbulence to see if they have any preferred level. When laboratory experiments are successful, attempt to find them at sea.

Phase 2:

Sea Scallop-22
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 23.5

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	3.2
Other Expenses:			
Within Project	--	--	2.0
Lab. Adm. & Ser.	--	--	3.0
Lab. Total	--	--	8.2
Regional Office			.082
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 63

Recommended by:

		Date
Originator	J. A. Posgay	8/6/59
Investigation Chief	J. A. Posgay	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph T. Rucker, Jr.	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 7/9/59

OYSTER INVESTIGATIONS: BACKGROUND, JUSTIFICATION AND OBJECTIVES

List of Projects

1. Preparation of the book on oyster biology based on studies of structure, functions and requirements of the American oyster Crassostrea virginica.
2. Productivity and methods of cultivation of oysters in the waters of the Cape Cod area.
3. Control of whelks, drills, and other predators of oysters in Cape Cod waters.

OYSTER INVESTIGATIONS: BACKGROUND, JUSTIFICATION AND OBJECTIVES

Sound knowledge of the biology, physiology and ecology of mollusks is the basis for successful management and development of shellfishery resources of the country. The need for such information regarding the oyster is particularly urgent because of the general decline in oyster production, widespread and unexplained mortalities of oysters in the Middle Atlantic and Northern States, depletion of oyster grounds by starfish and other predators and overfishing of public oyster bottoms. No handbook of this type is available in any language. The present knowledge of oyster biology is being summarized in a comprehensive book which is based on critical examination of the world literature and on original research conducted at Woods Hole Laboratory and in the field.

The oyster investigations consist of the following three projects:

1. Preparation of the book on oyster biology based on studies of structure, functions and requirements of the American oyster, Crassostrea virginica.
2. Productivity and method of cultivation of oysters in the waters of Cape Cod area.
3. Control of whelks, drills and other predators of oysters in Cape Cod waters.

SUMMARY CO[illegible]OL SCHEDULE

Investigation: Oyster
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Preparation of the book on oyster biology based on studies of structure functions and requirements of the American Oyster.	52.9	10.[illegible]	11.0	11.[illegible]	9.8	10.3	—	—	—	—	—
2. Productivity and methods of cultivation of oysters in the waters of the Cape Cod area	27.5	3.7	[illegible]	3.9	[illegible]	10.1	—	—	—	—	—
3. Control of whelks, drills, and other predators of oysters in Cape Cod waters	12.1	.8	1.0	2.[illegible]	2.3	5.6	—	—	—	—	—
Investigation Total	92.5	14.9	16.[illegible]	17.7	17.5	26.0	—	—	—	—	—

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: E. M. Galtsoff — Date 6/6/59
Recommended by: — Date
Lab. Director Herbert M. Graham
Reg. or Area Dir.
Branch Chief
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

Location Woods Hole, Mass.
Branch [illegible]
Date: June 26, 1959
File No.

Research Project Outline

Title of Project: Preparation of the book on oyster biology based on studies of structure, functions and requirements of the American oyster, Crassostrea virginica.

Investigation Title: Oyster Investigations

Investigation Chief: Paul S. Galtsoff

Project Leader: Paul S. Galtsoff — Name; Fishery Research Biologist — Title; GS-13 — Grade

Assistants: (Title and Grade)

Ruth L. Von Arx, Illustrator, GS-9 WHOI employee

(Part-time) William N. Shaw, GS-7

Collaborators:

Need for Information: Information regarding oyster biology and ecology is needed because of the general decline in oyster production, widespread and unexplained mortalities of oysters in the Middle Atlantic and Northern States, depletion of oyster grounds by starfish and other predators and overfishing of public oyster bottoms. No handbook of this type is available in any language.

Objective: The objective of the proposed book is to present the needed information on oysters for the use of conservation officers, oyster growers, Public Health officers, and biologists engaged in oyster research.

Method of Procedure:

Phase 1: Preparation of detailed oyster bibliography. The work completed except for the addition of current items. The bibliography comprises several thousand subject and author cards of publications in English and eight foreign languages.

Phase 2: Laboratory studies of anatomy, histology, ultrastructure (electron microscopy) and physiology. All this work has been completed except the study of oyster development. Preparation of illustrations for the text (about 200 were made, 50 remain to be done.)

Phase 3: Writing of the text. Nine chapters are finished and ready for revue by the Editor.

6-12-59 Phase 4: Corrections and changes suggested by the Editorial office, preparation of an index. The entire book including phase 4 is expected to be finished in 1961.

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 52.9

	FY 1959	FY 1960	FY 1961
Personal Services	9.3	8.5	7.2
Other Expenses:			
Within Project	2.1	1.3	3.1
	--	--	--
Lab. Adm. & Ser.	--	--	--
Lab. Total	11.4	9.8	10.3
Regional Office			
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 _____ _____

Investigation Chief Paul S. Galtsoff

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

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

19-2

Location Woods Hole, Mass.
Branch Marine Fisheries
Date: June 26, 1959
File No.

Research Project Outline

Title of Project: Productivity and methods of cultivation of oysters in the waters of the Cape Cod area.

Investigation Title: Oyster Investigations

Investigation Chief: Paul S. Galtsoff

Project Leader: William N. Shaw — Fishery Research Biologist — GS-7
Name — Title — Grade

Assistants: (Title and Grade)

Collaborators: Shellfish wardens of Chatham and Wareham; oyster growers of the Chatham area.

Need for Information: The advantages of raft culture as a method of developing latent oyster resources in the Cape area has been demonstrated by previous observations. Oysters kept above the bottom grow at a faster rate than those on the bottom but the ecological factors affecting their growth are not known.

Objective: Principal ecological factors affecting reproduction and growth will be studied in order to determine potential productivity of oyster bottoms and devise practical methods of their utilization.

Method of Procedure:
Phase 1: Growth and mortality of oysters kept at different elevations above bottom is measured at regular intervals. Two localities have been selected for comparative study; depending on facilities and personnel three places may be added for these studies. Initial observations in Oyster River show that this method of culture gives satisfactory results.
Phase 2: Principal ecological factors such as temperature, chemical composition of water and plankton content of tidal ponds and rivers of Cape Cod will be studied for the purpose of determining their effect on productivity. Additional factors such as water movements, rate of flushing of estuaries etc. may be studied if personnel and funds are available.

5-12-59
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Phase 3: Application of modern technique of seed production by various types of collectors will be studied with reference to their suitability to local conditions.

Phase 4: Tabulation and analysis of data. Preparation of report for publication.

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 27.5

	FY 1959	FY 1960	FY 1961
Personal Services	3.5	4.9	8.5
Other Expenses: Within Project	0.4	0.5	1.6
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	3.9	5.4	10.1
Regional Office			
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 _____ _____
Investigation Chief Paul S. Galtsoff
Laboratory Director Herbert W. Graham
Regional Director _____
Branch Chief _____
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

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

19-3

Location Woods Hole, Mass.
Branch Marine Fisheries
Date: June 25, 1959
File No.

Research Project Outline

Title of Project: Control of whelks, drills, and other predators of oysters in Cape Cod waters.

Investigation Title: Oyster Investigations

Investigation Chief: Paul S. Galtsoff

Project Leader: William N. Shaw Fishery Research Biologist GS-7
Name Title Grade

Assistants: (Title and Grade)

Collaborators: Shellfish wardens of Chatham and Wareham; oyster growers of the Chatham area.

Need for Information: Cultivation of oysters in Cape Cod waters has been a failure because of predation by whelks, drills, and other invertebrates. By using wooden traps the majority of the channeled whelks can be removed from the oyster bottoms. There is a need of improving the methods of control of this and other species, particularly the knobbed whelks, drills and flat worms.

Objective: To develop practical methods of controlling predators suitable to local conditions.

Method of Procedure:

Phase 1: Behavior of whelks and other enemies will be studied in order to improve the technique of using traps and other means of controlling these pests. Traps for catching channeled whelks proved to be efficient but information is needed concerning the time, location and manner in which they should be used for effective results.

Phase 2: The use of mechanical and chemical barriers in preventing the infestation of oyster grounds will be studied in the areas where experimental rafts are anchored.

Phase 3: Tabulation and analysis of data. Preparation of report for publication.

3-12-59
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Oysters 3

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 12.1

	FY 1959	FY 1960	FY 1961
Personal Services	2.0	1.9	4.0
Other Expenses: Within Project	0.4	0.4	1.6
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	2.4	2.3	5.6
Regional Office			
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 _____

Investigation Chief Paul S. Galtsoff

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

BENTHOS INVESTIGATION

The fishing industry of the Northeastern United States is primarily dependent upon marine groundfish such as cod, haddock, and flounders, that live on or near the sea bottom. The availability of food for these fish certainly has a bearing on their abundance, growth, and geographic occurrence within this region. Invertebrate animals and small fishes that serve as food for the commercially valuable groundfish constitute a predominant portion of the benthos. An inventory of foods available to groundfish, in conjunction with a study of the fishes' food habits will provide basic information necessary for understanding changes in growth, shifts in distribution, and fluctuations in abundance of the major commercial groundfishes of New England.

August 6, 1959

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SUMMARY CONTROL SCHEDULE

Investigation: Benthos
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Groundfish food resources of Georges Bank	67.8	23.6	15.0	14.2	15.0	--	--	--	--	--	--
2. Bottom sediments of Georges Bank	40.9	--	15.0	14.2	11.7	--	--	--	--	--	--
3. Bottom sediments of Browns Bank and Southern Gulf of Maine	48.1	--	--	--	11.4	14.0	13.2	9.5	--	--	--
4. Groundfish food habits	59.1	--	--	--	11.4	16.0	18.0	13.7	--	--	--
5. Groundfish food resources of Browns Bank & southern Gulf of Me.	54.3	--	--	--	--	13.0	19.0	10.3	12.0	--	--
6. Bottom sediments of Northern Gulf of Maine	39.5	--	--	--	--	13.4	12.8	13.3	--	--	--
7. Bottom sediments of southern New England	20.3	--	--	--	--	--	--	8.3	12.0	--	--
8. Groundfish food resources of southern New England	27.1	--	--	--	--	--	--	--	15.0	12.1	--
9. Food digestion rates of New England groundfish	39.8	--	--	--	--	--	--	--	15.0	12.6	12.2
10. Groundfish food resources of northern Maine	25.3	--	--	--	--	--	--	--	--	13.1	12.2
11. Influence of hydrographic conditions on groundfish foods	28.5	--	--	--	--	--	--	--	--	16.3	12.2
12. Food requirements of New England groundfish	17.7	--	--	--	--	--	--	--	--	--	17.7
Investigation Total	468.4	23.6	30.0	28.4	49.5	56.4	63.0	55.1	54.0	54.1	54.3

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: Roland L. Migley — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham 8/6/59

Reg. or Area Dir. Joseph T. Penniston

Branch Chief [signature] 12/24/59

Approved by: [signature]
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: Groundfish Food Resources of Georges Bank

Investigation Title: Benthos Investigation

Investigation Chief: R. L. Wigley

Project Leader: R. L. Wigley (Name), Fishery Research Biologist (Title), GS-11 (Grade)

Assistants: (Title and Grade)

R. B. Theroux, Fishery Aide, GS-5

Collaborators: U. S. National Museum, MCZ, and other scientific institutions.

Need for Information: The abundance, migrations, and growth of commercially important groundfish are closely associated with their food supply. If consistent correlations between the fish and their food supply become evident, predictions of changes in future abundance, growth rates, and geographic shifts in distribution of commercially valuable groundfish may result.

Objective: Inventory the primary groundfish foods on Georges Bank.

Method of Procedure:

Phase 1: Collect representative samples of benthic organisms by means of dredges and grab-samplers, also take photos of sea floor.

Phase 2: Sort the collections; identify and enumerate the contents.

In written reports, describe the benthic communities and the relationships between fish-foods and the abundance, growth and geographic occurrence of commercially important fishes.

Benthos - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 67.8

	FY 1959	FY 1960	FY 1961
Personal Services	5.1	5.0	--
Other Expenses:			
Within Project	1.0	1.0	--
	--	--	--
Lab. Adm. & Ser.	8.1	9.0	--
Lab. Total	14.2	15.0	--
Regional Office	.142	.150	
Washington Office			
Total			

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

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

Recommended by:

		Date
Originator	R. L. Wigley	8/6/59
Investigation Chief	R. L. Wigley	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Bottom Sediments of Georges Bank

Investigation Title: Benthos Investigation

Investigation Chief: R. L. Wigley

Project Leader: R. L. Wigley, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

R. B. Theroux, Fishery Aide, GS-5

Collaborators: Director, New York Soil Testing Laboratory

Need for Information: The occurrence of many benthonic invertebrate animals, which are the basic foods of commercially important groundfish, are restricted to specific areas by the bottom sediments. Delineation of benthic faunal communities will be aided and facilitated by determining geographic occurrence of the various sediment types.

Objective: Determine the physical composition and geographic distribution of the various sediment types occurring on Georges Bank.

Method of Procedure:

Phase 1: Collect sediment samples by means of a Scoopfish sampler and Smith bottom sampler. New York Soil Testing Laboratory will analyze the samples for organic content and particle-size composition.

Phase 2: Compute the statistical parameters, and present the results in graphic and written form.

Benthos - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 40.9

	FY 1959	FY 1960	FY 1961
Personal Services	5.1	2.3	--
Other Expenses:			
Within Project	1.0	0.6	--
	--	--	--
Lab. Adm. & Ser.	8.1	8.8	--
Lab. Total	14.2	11.7	--
Regional Office	.142	.117	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58; Phase 2 FY ; Phase 3 FY ; Project FY60

Recommended by:

		Date
Originator	R. L. Wigley	8/6/59
Investigation Chief	R. L. Wigley	8/6/59
Laboratory Director	Herbert V. Graham	8/6/59
Regional Director	Joseph H. Penner	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	[illegible]

Remarks

(Continue on reverse side)

#715 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: Bottom Sediments of Browns Bank and Southern Gulf of Maine

Investigation Title: Benthos Investigation

Investigation Chief: R. L. Wigley

Project Leader: R. L. Wigley, Fishery Research Biologist, GS-11
(Name, Title, Grade)

Assistants: (Title and Grade)

R. B. Theroux, Fishery Aide, GS-5

Collaborators: Director, New York Soil Testing Laboratory

Need for Information: The occurrence of many benthonic invertebrate animals, which are the basic foods of commercially important groundfish, are restricted to specific areas by the bottom sediments. Delineation of benthic faunal communities will be aided and facilitated by determining geographic occurrence of the various sediment types.

Objective: Determine the physical composition and geographic distribution of the various sediment types occurring on Browns Bank and Southern Gulf of Maine.

Method of Procedure:

Phase 1: Collect sediment samples by means of a Scoopfish sampler and Smith bottom sampler. New York Soil Testing Laboratory will analyze the samples for organic content and particle-size composition.

Phase 2: Compute the statistical parameters, and present the results in graphic and written form.

Benthos - 3
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 48.1

	FY 1959	FY 1960	FY 1961
Personnel Services	--	2.0	4.4
Other Expenses:			
Within Project	--	0.5	1.0
	--	--	--
Lab. Adm. & Ser.	--	8.9	8.6
Lab. Total	--	11.4	14.0
Regional Office		.114	.14
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 60 Phase 2 FY ; Phase 3 FY ; Project FY 62

Recommended by:

		Date
Originator	R. L. Wigley	8/6/59
Investigation Chief	R. L. Wigley	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pierce Jr.	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director	[illegible]	1-4-60

Remarks

(Continue on reverse side)

#715 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: Groundfish food habits

Investigation Title: Benthos Investigation

Investigation Chief: R. L. Wigley

Project Leader: Vacant, Fishery Research Biologist, GS-7
Name Title Grade

Assistants: (Title and Grade)

Collaborators: Possibly the Cod Investigation; Hake Investigation; Flounder Investigation; Haddock Investigation.

Need for Information: Evidence from several sources indicates that some of the more valuable species of groundfish are being replaced by less valuable species. Competition for food and predation may be two of the factors causing or enhancing this shift in species composition.

Objective: Study the food habits of several of the more valuable species of groundfish and several species of their competitors and predators.

Method of Procedure:

Phase 1: Collect stomach contents of cod, haddock, pollock, yellowtail and winter flounders, whiting, spiny-dogfish shark, skates, and goosefish. Analyze the stomach contents.

Phase 2: Prepare a written report describing the kinds and quantities of each major food consumed by each species of fish.

Benthos - 4

Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 59.1

	FY 1959	FY 1960	FY 1961
Personal Services	--	2.0	5.0
Other Expenses:			
Within Project	--	0.5	2.0
	--	--	--
Lab. Adm. & Ser.	--	8.9	9.0
Lab. Total	--	11.4	16.0
Regional Office		.114	.16
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY60 ; Phase 2 FY ; Phase 3 FY ; Project FY63

Recommended by:

		Date
Originator	R. L. Wigley	8/6/59
Investigation Chief	R. L. Wigley	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pecci-Thiel	8/19/59
Branch Chief	HOE	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Groundfish Food Resources of Browns Bank and Southern Gulf of Maine

Investigation Title: Benthos Investigation

Investigation Chief: R. L. Wigley

Project Leader: R. L. Wigley, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)

R. B. Theroux, Fishery Aide, GS-5

Collaborators: U. S. National Museum, MCZ, and other scientific institutions.

Need for Information: The abundance, migrations, and growth of commercially important groundfish are closely associated with their food supply. If consistent correlations between the fish and their food supply become evident, predictions of changes in future abundance, growth rates, and geographic shifts in distribution of commercially valuable groundfish may result.

Objective: Inventory the primary groundfish foods on Browns Bank and Southern Gulf of Maine.

Method of Procedure:

Phase 1: Collect representative samples of benthic organisms by means of dredges and grab-samplers, also take photos of sea floor. Sort the collections; identify and enumerate the contents.

Phase 2: In written reports describe the benthic communities and the relationships between fish-foods and the abundance, growth and geographic occurrence of commercially important fishes.

Benthos - 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 54.3

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	3.5
Other Expenses:			
Within Project	--	--	1.4
	--	--	--
Lab. Adm. & Ser.	--	--	8.1
Lab. Total	--	--	13.0
Regional Office			.13
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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. Wigley	8/6/59
Investigation Chief	R. L. Wigley	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph F. Pomeroy	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Bottom Sediments of Northern Gulf of Maine

Investigation Title: Benthos Investigation

Investigation Chief: R. L. Wigley

Project Leader: R. L. Wigley, Fishery Research Biologist, GS-11
Name Title Grade

Assistants: (Title and Grade)
R. B. Theroux, Fishery Aide, GS-5

Collaborators: Director, New York Soil Testing Laboratory

Need for Information: The occurrence of many benthonic invertebrate animals, which are the basic foods of commercially important groundfish, are restricted to specific areas by the bottom sediments. Delineation of benthic faunal communities will be aided and facilitated by determining geographic occurrence of the various sediment types.

Objective: Determine the physical composition and geographic distribution of the various sediment types occuring in Northern Gulf of Maine.

Method of Procedure:

Phase 1: Collect sediment samples by means of a Scoopfish sampler and Smith bottom sampler. New York Soil Testing Laboratory will analyze the samples for organic content and particle-size composition.

Phase 2: Compute the statistical parameters, and present the results in graphic and written form.

Benthos - 6

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 39.5

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	3.5
Other Expenses:			
Within Project	--	--	1.0
	--	--	--
Lab. Adm. & Ser.	--	--	8.9
Lab. Total	--	--	13.4
Regional Office			.134
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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. Wigley	8/6/59
Investigation Chief	R. L. Wigley	8/6/59
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph R. Pierce [illegible]	8/19/59
Branch Chief	[illegible]	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 7/9/59

PLANKTON INVESTIGATIONS

The planktonic organisms as a group are the first link in the marine food chain and are, accordingly, all important to those animals higher up in the food chain. The success or failure of the plankton crop may in the long run turn out to be the most decisive factor in the success of spawn of many species of fish.

Studies of the plankton organisms are desired as well to elucidate environmental changes. Various plankters have been demonstrated to be more sensitive indicators of changing hydrographic conditions than many of the instruments designed by man. Little work has been done along this line in our area of interest.

August 6, 1959

SUMMARY C ROL SCHEDULE

Investigation: Plankton
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
1. Phytoplankton studies	21.5	8.6	8.3	4.6	--	--	--	--	--	--	--
2. Zooplankton studies	26.5	12.3	7.7	6.5	--	--	--	--	--	--	--
3. Fate of haddock eggs and larvae	87.9	30.5	19.7	19.0	18.7	--	--	--	--	--	--
4. Development of Plankton samplers	33.3	--	9.7	7.0	16.6	--	--	--	--	--	--
5. Larval studies	33.5	--	9.7	7.2	16.6	--	--	--	--	--	--
6. Vertical distribution of plankton	47.5	--	--	7.3	17.1	23.1	--	--	--	--	--
7. Study of indicator species	65.0	--	--	--	--	23.3	26.8	14.9	--	--	--
8. Distribution and biology of Cyanea	81.7	--	--	--	--	23.3	26.8	13.9	17.7	--	--
9. Seasonal distribution of eggs and larvae (all species)	109.4	--	--	--	--	--	26.0	12.2	17.7	26.7	26.8
10. Food supply studies of pelagic fish	81.6	--	--	--	--	--	--	10.9	17.3	26.5	26.9
Investigation Total	587.9	51.4	55.1	51.6	69.0	69.7	79.6	51.9	52.7	53.2	53.7

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Date 8/6/59

Prepared by: John B. Colton

Recommended by: Date

Lab. Director Herbert W. Graham 8/6/59

Reg. or Area Dir. Joseph A. Pierce Jr.

Branch Chief [illegible]

Approved by: [illegible]
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: Phytoplankton studies

Investigation Title: Plankton Ecology

Investigation Chief: ~~J. B. Colton~~ Vacant

Project Leader: ~~J. B. Colton~~ Vacant F. R. B. GS-11
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Phytoplankton is one of the important links in the food chain in the ocean. We must know something of its distributions and fluctations to aid us in our understanding of the ecology of the area.

Objective: To study the most abundant species of phytoplankton present in the Gulf of Maine and Georges Bank area.

Method of Procedure: Started 1957 - 1959 (Discontinued). From Hardy Plankton Recorder gauges wash off phytoplankton and do a qualitative and quantitative analysis of
Phase 1: the data. Work was discontinued due to lake of funds and need for emphysis of other plankton studies.

Phase 2:

Plankton - 1

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 21.5

	FY 1959	FY 1960	FY 1961
Personal Services	0.5	--	--
Other Expenses:			
Within Project	--	--	--
	--	--	--
Lab. Adm. & Ser.	4.1	--	--
Lab. Total	4.6	--	--
Regional Office	.046		
Washington Office			
Total			

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

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

Recommended by: Date

Originator John B. Colton

Investigation Chief [illegible] 8/

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph F. Passmore 8/19/59

Branch Chief [illegible] 12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Zooplankton studies

Investigation Title: Plankton ecology

Investigation Chief: ~~J. B. Colton~~ Vacant

Project Leader: R. R. Marak (Name) F. R. B. (Title) GS-9 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: A knowledge of the zooplankton of the Gulf of Maine and Georges Bank must be attained in order to understand better the relationship of the larval fish to its environment with special attention given to the food habits of these fish.

Objective: To study the food habits of larval cod, haddock, and pollock.

Method of Procedure: Started 1957 - Completed 1959. Examine stomachs of cod, haddock and pollock obtained in 1-meter net tows over the area. Tabulate what

Phase 1 food is being eaten. Relate food eaten to fish eating it. Work completed and manuscript ready for publication.

Phase 2:

Plankton - 2

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 26.5

	FY 1959	FY 1960	FY 1961
Personal Services	2.5	--	--
Other Expenses:			
Within Project	--	--	--
	--	--	--
Lab. Adm. & Ser.	4.0	--	--
Lab. Total	6.5	--	--
Regional Office	.065		
Washington Office			
Total			

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

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

Recommended by:

	Date
Originator John B. Colton	
Investigation Chief	
Laboratory Director Herbert W. Graham	8/6/59
Regional Director Joseph L. Pomeroy	8/19/59
Branch Chief [illegible]	12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Fate of haddock eggs and larvae

Investigation Title: Plankton ecology

Investigation Chief: Vacant

Project Leader: Vacant — F. R. B. — GS-11
(Name — Title — Grade)

Assistants: (Title and Grade)

R. R. Marak, F. R. B., GS-9
D. Miller, F. R. B., GS-9

Collaborators:

Need for Information: A method for predicting the strength of a year class of fish is greatly needed in order to aid commercial fishermen.

Objective: To determine the causes and fluctuations in strength of year classes.

Method of Procedure: Started 1957 - End in 1960. Plankton-hydrographic surveys during and following the spawning season. Report published in 1959 on Heat death
Phase 1: of Larvae. SSR's being prepared for completion in 1960.

Phase 2:

Plankton - 3

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 87.9

	FY 1959	FY 1960	FY 1961
Personal Services	6.0	4.6	--
Other Expenses:			
Within Project	3.0	0.5	--
	--	--	--
Lab. Adm. & Ser.	10.0	13.6	--
Lab. Total	19.0	18.7	--
Regional Office	.19	.187	
Washington Office			
Total			

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

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

Recommended by: Date

Originator John B. Colton

Investigation Chief John B. Colton

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph A. Pomeroy 8/19/59

Branch Chief WHE 12-24-59

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Development of Plankton samplers

Investigation Title: Plankton ecology

Investigation Chief: ~~J. B. Colton~~ Vacant

Project Leader: D. Miller (Name) FRB (Title) GS-9 (Grade)

Assistants: (Title and Grade)

Collaborators: National Bureau of Standards, Capacity, Density and Fluid Meters Section, and Woods Hole Oceanographic Institution.

Need for Information: There is always a need to produce instruments which can improve our collecting methods.

Objective: To develop better instruments for collection of plankton at surface and subsurface levels.

Method of Procedure: Started 1958 - Finish 1960. Design in consultation with National Bureau of Standards, Capacity, Density and Fluid Meters Section and

Phase 1: Woods Hole Oceanographic Institution a Hi-Speed plankton sampler. Report published on Kite Otter multiplane depressor and paper on Hi-Speed sampler to be out in 1960.

Phase 2:

Plankton 4

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.3

	FY 1959	FY 1960	FY 1961
Personal Services	2.5	2.5	---
Other Expenses:			
Within Project	0.5	0.5	---
---	---	---	---
Lab. Adm. & Ser.	4.0	13.6	---
Lab. Total	7.0	16.6	---
Regional Office	.07	.166	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY58 ;Phase 2 FY ;Phase 3 FY ;Project FY 60

Recommended by: Date

Originator John B. Colton

Investigation Chief [redacted]

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph F. Pomeroy 8/19/59

Branch Chief HSE 12-24-57

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Larval studies

Investigation Title: Plankton ecology

Investigation Chief: ~~[illegible]~~ Vacant

Project Leader: D. Miller (Name) F. R. B. (Title) GS-9 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: In order to understand more about the early life history of the haddock we must know of their interrelation with other organisms (principally other larval fish).

Objective: To describe the larval stages of all species commonly found on Georges Bank in the spring of the year.

Method of Procedure: Start 1958 - End 1960. Examination of plankton samples, removing all larvae for identification. Strip and fertilize eggs of mature fish
Phase 1: (for larvae of known parentage). Culture larvae aboard ship and ashore for identification purposes. Key to be published in 1960.

Phase 2:

Plankton 5

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.5

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	2.5	---
Other Expenses:			
Within Project	0.2	0.5	---
---	---	---	---
Lab. Adm. & Ser.	4.0	13.6	---
Lab. Total	7.2	16.6	---
Regional Office	.072	.166	
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 58; Phase 2 FY ; Phase 3 FY ; Project FY 60

Recommended by: Date

Originator John B. Colton

Investigation Chief [redacted]

Laboratory Director Herbert W. Graham

Regional Director Joseph A. Dragovich

Branch Chief [redacted] 12-24-57

Approved by:

Division Chief for Director

Remarks

(Continue on reverse side)

#715 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: Vertical distribution of plankton

Investigation Title: Plankton ecology

Investigation Chief: Vacant

Project Leader: R. R. Marak (Name) F.R.B. (Title) GS-9 (Grade)

Assistants: (Title and Grade)

F.R.B. GS-9 60% time

Collaborators:

Need for Information: In order to gain a more thorough knowledge of the ecology of the water column we must know about the vertical distribution of these animals and their relation to one another. Also, we must know more about these animals vertical movements so that we might more effectively sample them.

Objective: To sample the Georges Bank area with hi-speed samplers at various depths simultaneously.

Method of Procedure: Start 1959, end 1961. Tow hi-speed samplers at 0-10-20-30-40-50-75-100 meters at specific

Phase 1: locations in spawning grounds and nursing grounds.
Analyze data collected.
Prepare scientific publication of results.

Phase 2:

Plankton 6

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 47.5

	FY 1959	FY 1960	FY 1961
Personal Services	3.0	4.0	4.3
Other Expenses:			
Within Project	0.3	0.5	1.5
---	---	---	---
Lab. Adm. & Ser.	4.0	12.6	17.3
Lab. Total	7.3	17.1	23.1
Regional Office	.073	.171	.231
Washington Office			
Total			

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

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

Recommended by:
Originator John B. Colton Date

Investigation Chief [redacted]

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph F. Pomeroy 8/19/59

Branch Chief [illegible] 12-24-57

Approved by:
Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 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: Study of Indicator Species

Investigation Title: Plankton

Investigation Chief: Vacant

Project Leader: Vacant (Name) F.R.B. (Title) (Grade)

Assistants: (Title and Grade)

F.RB. GS-11 50% time

Collaborators: Hydro surveys.

Need for Information: To supplement hydrographic information on water movements in our area of investigation.

Objective: To find species which may be used as indicators of water movements.

Method of Procedure: Start 1961, complete in 1963. Analyze data from Plankton surveys and find, if possible, animals which can

Phase 1: be used to trace water movements. Cooperation with hydro team or alone on publication.

Phase 2:

Plankton 7
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 65.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	4.5
Other Expenses:			
Within Project	---	---	1.5
	---	---	---
Lab. Adm. & Ser.	---	---	17.3
Lab. Total	---	---	23.3
Regional Office			.233
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY61 ; Phase 2 FY ; Phase 3 FY ; Project FY 63

Recommended by:

		Date
Originator	John B. Colton	
Investigation Chief	[illegible]	
Laboratory Director	Herbert W. Graham	8/6/59
Regional Director	Joseph A. Pomeroy	8/19/59
Branch Chief	HHE.	12-24-59

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

Specify species.

#715 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: Biology and distribution of Cyanea

Investigation Title: Plankton

Investigation Chief: Vacant

Project Leader: Vacant (Name) F.R.B. (Title) (Grade)

Assistants: (Title and Grade)

F.R.B. GS-9 full time

Collaborators:

Need for Information: Because there is some definite relationship between some fish larvae and this large jelly fish; the biology and distribution of this organism should be studied.

Objective: To study how and where this animal (Cyanea) is distributed and why when young 20 to 100 mm. haddock are found in quantity they are always taken along with Cyanea.

Method of Procedure: Start 1961, complete in 1964. Analyze survey records of observations and possibly catch of Cyanea. Supplement with

Phase 1: cruises (2), one in late spring, one late summer (one week long) to trace movements of these animals and collect data about ecology of the area in which they are living. Use 1 meter nets, mid depth trawls and try new gear which might sample the animals more adequately.

Phase 2:

Plankton 8

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 81.7

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	5.0
Other Expenses:			
Within Project	---	---	1.0
---	---	---	---
Lab. Adm. & Ser.	---	---	17.3
Lab. Total	---	---	23.3
Regional Office			.233
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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 John B. Colton

Investigation Chief John B. Colton

Laboratory Director Herbert W. Graham 8/6/59

Regional Director Joseph F. Pierce Jr. 8/19/59

Branch Chief [illegible] 12-24-57

Approved by:

Division Chief for Director [illegible]

Remarks

(Continue on reverse side)

#715 7/9/59

PELAGIC FISH INVESTIGATIONS

The pelagic fishes, such as the tuna, mackerel, round herring, swordfish and many others, require quite different methods of investigation than the demersal species and are accordingly put into a separate research investigation.

Our pelagic fisheries, especially that of the mackerel, have received little attention of late, due primarily to the lack of any substantial fishery (exception herring) in this area. The mackerel fishery has suffered an extreme decline but with changing environmental changes may once again become an important New England fishery. Studies on this fish should be started as soon as possible so that we may be in a position to document these changes and to evaluate management measures. The physical act of studying the mackerel will make it possible to concomitantly investigate the biology of all other important pelagic species on the continental shelf.

The tuna fishery is becoming a real possibility off New England and the basic biological facts concerning this species need prompt attention. Of paramount importance now is further knowledge concerning the origin, distribution, and abundance of this fish.

August 6, 1959

PELAGIC FISH INVESTIGATION

List of Projects

Mackerel

1. Tagging and migration
2. Seasonal variations in adipose eyelid
3. Morphometric studies
4. Aging techniques
5. Age and growth
6. Seasonal distribution
7. Mortality (natural)
8. Biostatistics

Bluefin Tuna

9. Validation of aging techniques
10. Age and growth of Atlantic bluefin
11. Distribution and abundance (North of Hatteras)
12. Relation of environment to distribution
13. Food of Northwest Atlantic bluefin

Other Pelagic Species

14. Distribution and abundance of round herring
15. Biology of alewives (support to R. I.)

SUMMARY CO' OL SCHEDULE

Investigation: Pelagic Fish
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Mackerel											
1. Tagging and migration	33.6	--	--	--	--	7.0	7.0	5.5	1.9	6.1	6.1
2. Seasonal variations in adipose eyelid	7.0	--	--	--	--	2.7	1.4	1.9	1.0	--	--
3. Morphometric studies	16.3	--	--	--	--	--	--	2.2	1.9	6.1	6.1
4. Aging techniques	3.9	--	--	--	--	2.7	1.2	--	--	--	--
5. Age and growth	7.7	--	--	--	--	2.7	1.2	2.2	1.6	--	--
6. Seasonal distribution	25.7	--	--	--	--	--	--	5.5	6.6	6.7	6.9
7. Mortality (natural)	9.6	--	--	--	--	--	--	1.7	1.6	2.9	3.4
8. Biostatistics	12.7	--	--	--	--	2.0	1.3	1.6	1.6	2.9	3.3
Bluefin Tuna											
9. Validation of aging techniques	1.1	--	--	--	--	--	1.1	--	--	--	--
10. Age and growth of Atlantic bluefin	19.0	--	--	--	--	--	7.0	5.0	7.0	--	--
11. Distribution and abundance (North of Hatteras)	27.6	--	--	--	--	--	6.5	6.5	8.6	6.0	--
12. Relation of environment to distribution	31.6	--	--	--	--	--	--	6.5	8.6	7.0	9.5
13. Food of Northwest Atlantic bluefin	26.0	--	--	--	--	--	--	5.5	6.7	6.8	7.0
Other pelagic species											
14. Distribution and abundance of round herring	9.8	--	--	--	--	--	1.2	1.6	1.3	2.5	3.2
15. Biology of alewives (support to R.I.)	8.1	--	--	--	--	6.5	1.6	--	--	--	--
Investigation Total	239.7	--	--	--	--	23.6	29.5	45.7	48.4	47.0	45.5

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: R. L. Edwards — Date 8/6/59

Recommended by: — Date

Lab. Director Herbert W. Graham — 8/6/59

Reg. or Area Dir. Joseph A. Pierce

Branch Chief

Approved by:

Division Chief for Director

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

#714 7/9/59

must be delayed Pending funds and personnel.

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: Mackerel-tagging and migration

Investigation Title: Pelagic fish

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Altho once one of the biggest fisheries in New England, research on this fishery never truely solved the problems of mackerel migration and particularly that of their winter range.

Objective: To determine seasonal migratory patterns.

Method of Procedure:

Phase 1: Development of satisfactory tag and analysis of tag returns followed by corroborative research vessel cruises.

Phase 2:

Pelagic Fish 1
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 33.6

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	1.0
[illegible]	---	---	[illegible]
Lab. Adm. & Ser.	---	---	5.0
Lab. Total			7.0
Regional Office			.07
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 66

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	Joseph A. Pearson Jr.	8/19/59
Branch Chief		

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

With the change
funding from 1 permanent
to [illegible]

#715 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: Seasonal variations in adipose eyelid

Investigation Title: Pelagic fishes

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The mackerel is still a "mystery" fish in that is seasonal habits are apparently peculiar. The adipose eyelid undergoes marked seasonal variations in development. An understanding of these changes and their functional meaning may help to explain seasonal changes in behavior.

Objective: To determine seasonal changes in structure and function of the adipose eyelid.

Method of Procedure:

Phase 1: Critical examination of appropriate biological material - structurally and histologically.

Phase 2:

Pelagic Fish 2
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 7.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	0.5
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.	---	---	2.0
Lab. Total	---	---	2.7
Regional Office			.027
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY64

Recommended by:
Originator R.L.Edwards Date 8/6/59
Investigation Chief R. L. Edwards 8/6/59
Laboratory Director Herbert W. Graham 8/6/59
Regional Director Joseph T. Pruitt 8/19/59
Branch Chief
Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Project to be dropped pending funds and personnel

#715 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: Mackerel-ageing techniques

Investigation Title: Pelagic fish

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: The mackerel, when abundant, had a marked cycle of abundance. Although, the causes of these fluctuations were never adequately described, it would not have been possible to evaluate any possible effects of environmental change, etc., had they been defined without a knowledge of the age and growth parameters of the mackerel.

Objective: To develop adequate ageing techniques.

Method of Procedure:

Phase 1: Analysis of cyclic structure of fin rays and other parts to determine best ageing techniques.

Phase 2: Validation of technique.

Pelagic Fish 4
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 3.9

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	0.5
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.	---	---	2.0
Lab. Total	---	---	2.7
Regional Office			.027
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 62

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	Joseph J. Pomeroy	**8/19/59**
Branch Chief		

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Should
Assist in Larger Study
Funds & Personnel
APPR 12-24-59

#715 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 of mackerel

Investigation Title: Pelagic fish

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Population estimate studies required adequate age and growth data. Growth rate data also required in order to assess management proposals, particularly should this fish ever again enter the fishery in its former abundance and develop as well its former cyclic nature.

Objective: To determine growth rates and their variations.

Method of Procedure:

Phase 1: Using fin ray or other validated technique, prepare an adequate body of data on the age and growth.

Phase 2:

Pelagic Fish 5
Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 7.7

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	0.5
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.	---	---	2.0
Lab. Total	---	---	2.7
Regional Office			.027
Washington Office			
Total			

Recommended Source of Funds S-K and Regular
(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 Joseph G. Peterson 8/19/59
Branch Chief
Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Project is delayed pending funds of personnel
[illegible] 12-29-59

#715 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: Mackerel biostatistics

Investigation Title: Pelagic fishes

Investigation Chief: Vacant

Project Leader: Vacant
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: A consistent body of catch data is prerequisite to any population dynamics study.

Objective: To prepare biostatistical report.

Method of Procedure:

Phase 1: Analysis and compilation of catch and research vessel data bearing on abundance, distribution and age composition.

Phase 2:

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 12.7

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	0.5
Other Expenses:			
Within Project	---	---	0.2
	---	---	---
Lab. Adm. & Ser.	---	---	1.3
Lab. Total	---	---	2.0
Regional Office			.02
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 66

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	Joseph T. Quinn	8/19/59
Branch Chief		

Approved by:
Division Chief for Director

Remarks

(Continue on reverse side)

Project to be charged pending funds & personnel
[illegible] 8-24-59

#715 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: Biology of alewifes

Investigation Title: Pelagic fish

Investigation Chief:

Project Leader: R. Cooper, Student Assistant Fishery Aid, GS-5
(Name, Title, Grade)

Assistants: (Title and Grade)

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

Collaborators:

Dr. Saul Saila, University of Rhode Island, Marine Laboratory

Need for Information: The alewife contributes more than 30 million pounds per year to the meal industry. The project is designed to encourage and aid research on this fish outside of our Laboratory.

Objective: To increase our knowledge of the alewife.

Method of Procedure:

Phase 1: Research is being done on tagging techniques, association of alewives with particular river systems, racial breakdown, and age and growth.

Phase 2:

Pelagic Fish 15
Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 8.1

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	1.0
Other Expenses:			
Within Project	---	---	0.5
	---	---	---
Lab. Adm. & Ser.	---	---	5.0
Lab. Total	---	---	6.5
Regional Office			.065
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY 61; Phase 2 FY ; Phase 3 FY ; Project FY 62

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	Joseph T. Penniman	8/19/59
Branch Chief		
Approved by:		
Division Chief for Director		

Remarks

(Continue on reverse side)

Should be delayed pending
[illegible] funds if [illegible]
[illegible] 12-24-59

#715 7/9/59

PORT POOL

Collection of biostatistical data at fishing ports.

August 6, 1959

SUMMARY CONTR(SCHEDULE

Investigation: **Port Pool**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	681.9	**27.7**	**37.1**	**47.3**	**65.0**	**72.1**	**78.3**	**84.8**	**87.6**	**89.8**	**92.2**
Investigation Total	**681.9**	**27.7**	**37.1**	**47.3**	**65.0**	**72.1**	**78.3**	**84.8**	**87.6**	**89.8**	**92.2**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: **Lawrence H. Couture**

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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

Location: Woods Hole, Mass.
Date: August 6, 1959

RESEARCH PROJECT OUTLINE

TITLE OF PROJECT: Port Pool (Sampling the Commercial Landings)
INVESTIGATION TITLE:
INVESTIGATION CHIEF: Lawrence H. Couture
PROJECT LEADER: Lawrence H. Couture F.R.B. GS-9

ASSISTANTS: (Title and Grade)

Claude F. Bocken, Fishery Aid, GS-6, Gloucester, Mass.
Charles L. Philbrook, Fishery Aid, GS-6, Rockland, Maine
Albert F. Thibodeau, Fishery Aid, GS-6, Portland, Maine
John C. Malone, Fishery Aid, GS-6, Boston, Mass.
John R. Kallio, Fishery Aid, GS-5, Gloucester, Mass.
Paul P. Swain, Fishery Aid, GS-5, New Bedford, Mass.
Clinton E. Watson, Fishery Aid, GS-5, Boston, Mass.
Theodore Gallagher, Fishery Aid, GS-5, Point Judith, Rhode Island
Harry H. Horrell, Fishery Aid, GS-5, Point Judith, Rhode Island
Philip H. Chase, Jr., Fishery Aid, GS-5, New Bedford, Mass.
Vacancy, Clerk-Typist, GS-4, Woods Hole, Mass.
Vacancy, Fishery Aid, GS-5, Hampton, Virginia
Vacancy, Fishery Aid, GS-5, Woods Hole, Mass.
Vacancy, Fishery Aid, GS-5, Woods Hole, Mass.

COLLABORATORS:

Dept. of Conservation and Ed. Dev. New Jersey
Branch of Statistics, Div. of Industrial Research & Services
Narragansett Marine Laboratory, University of Rhode Island
Dept. of Sea and Shore Fisheries, Maine

NEED FOR INFORMATION:

The operation of field stations in Region 3, Bureau of Commercial Fisheries is required to obtain the basic biological and statistical data from the commercial fisheries of the Atlantic Ocean from Eastport, Maine, to Hampton, Virginia. These data are used by various investigations at the Woods Hole Biological Laboratory and the StatisticalCenter at Gloucester, Massachusetts.

OBJECTIVE:

To collect at ports of landings the interview information, commercial statistics and biological samples required by the various investigations at the Woods Hole Biological Laboratory and the commercial market statistics needed by the Gloucester Statistical Center.

METHOD OF PROCEDURE:

The Bureau of Commercial Fisheries agents who are stationed at Eastport, Rockland and Portland, Maine; Gloucester, Boston, Provincetown and New Bedford, Massachusetts; Point Judith, Rhode Island; and Hampton, Virginia, obtain confidential interview information from the captains or owners of fishing vessels concerning the exact areas fished, time spent in productive fishing, time lost during the trip, depths fished, catch by species, gear used, and accurate positions fished on each trip. From vessels that have fished in certain areas they obtain samples of the catch and perform biological techniques including length-frequency measurements, scale and otoliths samples, and when directed, samples of gonads, stomachs, and/or other organs.

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 681.9

	FY 1959	FY 1960	FY 1961
Personal Services	40.9	59.3	65.0
Other Expenses: Within Project			
Lab. Adm. & Ser.	6.4	5.7	7.1
Lab. Total	47.3	65.0	72.1
Regional Office			
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

Recommended by: Date
Originator _____
Investigation Chief Lawrence H. Couture
Laboratory Director Herbert W. Graham
Regional Director _____
Branch Chief _____
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

FISH TAG SERVICE

This is a service unit for various investigations. A tag clerk is employed to maintain a stock of various kinds of tags, issue them to biologists as needed, maintain an ~~impressed~~ imprest fund for payment of rewards, pay the rewards (via port agents), be responsible for acknowledging returns, and maintain the tagging records.

This is a continuing service.

August 6, 1959

SUMMARY CONT. SCHEDULE

Investigation: **Fish Tag Service**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	59.6	4.2	4.6	4.8	5.0	6.0	6.3	6.5	6.8	7.1	7.4
Investigation Total	59.6	4.2	4.6	4.8	5.0	6.0	6.3	6.5	6.8	7.1	7.4

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Date

Recommended by:

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: _____

Investigation Title: _____

Investigation Chief: _____

Project Leader: Sterling A. Bogswell Fish. Meth. and Equip. Spec. GS-6
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 59.6

	FY 1959	FY 1960	FY 1961
Personal Services	4.8	5.4	5.4
Other Expenses:			
Within Project			
Lab. Adm. & Ser.		0.5	0.5
Lab. Total	4.8	5.9	5.9
Regional Office			
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

Recommended by:
Originator _____ Date _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

ROUTINE AGE READING UNIT--JUSTIFICATION

Carrying out routine age determination for the major New England fish stocks is a laborious, time-consuming, but necessary task, presently carried out on a part-time basis by six individual biologists in each of seven single species investigations. The data are required for assessing the effects of fishing upon the stocks and for carrying out population dynamics studies.

As validation of age reading techniques are completed, the readings become more routine and should then be carried out by specialized personnel who can read large numbers of scales, otoliths, or other structures more efficiently and with greater production. This will relieve biologists of such routine, time-consuming work and permit them to carry out more creative activities.

It is proposed that routine age determinations of haddock, redfish, scup, red hake and other industrial fishes, and flounders be started in 1961, of silver hake and cod in 1962, and in 1964, routine age determinations be started for pollock and other boreal groundfishes.

Routine age determinations of other species of interest will be phased into the project as the age method is validated and standardized.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: **Age Reading**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Routine Age Reading Unit	**98.4**	--	--	--	--	**15.4**	**14.9**	**15.9**	**16.9**	**17.4**	**17.9**
Investigation Total	**98.4**	--	--	--	--	**15.4**	**14.9**	**15.9**	**16.9**	**17.4**	**17.9**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Date

Recommended by: **Herbert W. Graham** Date

Lab. Director

Reg. or Area Dir.

Branch Chief

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: **Routine Age Reading Unit**

Investigation Title: **Data Collection**

Investigation Chief: **Vacant** **F.P.B.** **GS-9**

Project Leader: **Vacant** **F.P.B.** **GS-9**
Name Title Grade

Assistants: (Title and Grade)

F.P.B. GS-5
Aide GS-3

Collaborators:

Need for Information: **Age compositions of New England landings of fishes are needed by the species projects to evaluate the populations of fishes and to carry out population dynamics studies.**

Objective: **To make routine readings of scales, otoliths and other structures for age determinations and submit reports of ages to species projects.**

Method of Procedure: **Prepare scales, otoliths, etc. for reading. Read and record ages.**

Phase 1: **Record ages and compute necessary back calculations. Submit reports to the research projects.**

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project [illegible]

	FY [illegible]	FY [illegible]	FY [illegible]
Personal Services	--	--	[illegible]
Other Expenses:			
Within Project			
Lab. Adm. & Ser.			[illegible]
Lab. Total	--	--	[illegible]
Regional Office			
Washington Office			
Total			

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

Estimated Date of Completion: Phase 1 FY [illegible]; Phase 2 FY ___; Phase 3 FY ___; Project FY ___

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director _____

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

MECHANICAL DATA PROCESSING

The pressing requirements of this laboratory for processed data are quickly exceeding the capacities of even a large number of statistical clerks. As a result, a very large volume of fishery data of great interest to our general problems is accumulating without being utilized because of a lack of manpower. The proper handling of such data can be made feasible without undue personnel addition by the use of a few relatively simple and inexpensive data processing machines and our Laboratory versatility will be greatly increased by the use of electronic computers available in service bureaus. It is imperative that our internal data processing systems be mechanized at the earliest possible date.

August 6, 1959

SUMMARY CO' 'OL SCHEDULE

Investigation: **Mechanical Data Processing**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Mechanical processing center for laboratory equipment, materials and outside computer work.	**126.1**	**.6**	**2.0**	**.7**	**3.0**	**24.5**	**18.5**	**18.7**	**19.0**	**19.2**	**19.9**
Investigation Total	**126.1**	**.6**	**2.0**	**.7**	**3.0**	**24.5**	**18.5**	**18.7**	**19.0**	**19.2**	**19.9**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: **Robert L. Edwards** Date

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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, 1958
File No.

Research Project Outline

Title of Project: Mechanical Data Processing

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 12.1

	FY [illegible]	FY 1960	FY 1961
Personal Services	--	--	[illegible]
Other Expenses:			
Within Project			
Lab. Adm. & Ser.	[illegible]	[illegible]	20.3
Lab. Total	.7	[illegible]	2.5
Regional Office			
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 ___

Recommended by:
Originator _____ Date _____
Investigation Chief [illegible]
Laboratory Director [illegible]
Regional Director _____
Branch Chief _____
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

DRAFTING

The volume of work required to produce the charts, graphs, illustrations and drawings required for manuscripts, reports, meetings, etc., demands the full-time services of a scientific illustrator at the Laboratory. Original design and sketches for public display and exhibits in the aquarium add to the workload of this position. Commercial duplicating (as authorized) is included in this budget.

August 6, 1959

SUMMARY CO' 'OL SCHEDULE

Investigation: **Drafting**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years									
		57	58	59	60	61	62	63	64	65	66
	76.1	**4.6**	**5.1**	**7.1**	**6.1**	**9.3**	**8.2**	**8.7**	**9.0**	**9.0**	**9.0**
Investigation Total	**76.1**	**4.6**	**5.1**	**7.1**	**6.1**	**9.3**	**8.2**	**8.7**	**9.0**	**9.0**	**9.0**

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: **Vincent A. Mackesy**

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Drafting

Investigation Title:

Investigation Chief:

Project Leader: Frank A. Bailey (Name) Scientific Illustrator (Stat. Draft) (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 76.1

	FY 1959	FY 1960	FY 1961
Personal Services	5.1	5.3	5.4
Other Expenses:			
Within Project			
Lab. Adm. & Ser.	2.0	0.8	3.9
Lab. Total	7.1	6.1	9.3
Regional Office			
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

Recommended by:
Originator _____ Date _____
Investigation Chief Vincent A. Mackesy
Laboratory Director Herbert W. Graham
Regional Director _____
Branch Chief _____
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

PHOTOGRAPHY

All of our photo reproduction, film work, microphotography, etc. requires the full-time services of a photographer. Work is performed both at sea and in the laboratory. Documentary films, slides, and stills are frequently used by Regional and Washington offices.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: **Photography**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	75.0	**5.0**	**5.1**	**6.6**	**6.9**	**7.6**	**9.3**	**8.6**	**8.5**	**8.7**	**8.7**
Investigation Total	**75.0**	**5.0**	**5.1**	**6.6**	**6.9**	**7.6**	**9.3**	**8.6**	**8.5**	**8.7**	**8.7**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: **Vincent A. Mackesy**

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Photography

Investigation Title:

Investigation Chief:

Project Leader: Robert K. Brigham (Name) Photographer (Gen.) (Title) GS-7 (Grade)

Assistants: (Title and Grade)

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 75.0

	FY 1959	FY 1960	FY 1961
Personal Services	5.1	5.3	5.4
Other Expenses:			
Within Project			
Lab. Adm. & Ser.	1.5	1.6	2.2
Lab. Total	6.6	6.9	7.6
Regional Office			
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 ___

Recommended by: Date

Originator _____

Investigation Chief Vincent A. Mackesy

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

LIBRARY SERVICES

This Laboratory maintains a small library specializing in fishery literature to provide the scientific staff with a readily available source of the more commonly used reference works. More specialized and less frequently used items are borrowed from university and institutional libraries

At the present time, the library contains approximately 500 books and 500 serial publications, the latter consisting of about 7,500 items.

The library is open to the public and is used occasionally by the other scientific institutions in Woods Hole.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: Library
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	61.5	4.5	5.9	5.3	5.8	6.3	6.4	6.7	6.8	6.9	6.9
Investigation Total	61.5	4.5	5.9	5.3	5.8	6.3	6.4	6.7	6.8	6.9	6.9

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Roland L. Migley Date

Recommended by:

Lab. Director Herbert W. Graham

Reg. or Area Dir.

Branch Chief

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:
Date:
File No.

Research Project Outline

Title of Project: _____

Investigation Title: _____

Investigation Chief: Elizabeth B. Leonard Librarian GS-5

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project [illegible]

	FY [illegible]	FY [illegible]	FY [illegible]
Personal Services	[illegible]	[illegible]	[illegible]
Other Expenses:			
Within Project			
Lab. Adm. & Ser.	[illegible]	[illegible]	[illegible]
Lab. Total	[illegible]	[illegible]	[illegible]
Regional Office			
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 ___

Recommended by: Date

Originator _____

Investigation Chief [illegible]

Laboratory Director [illegible]

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

SCIENTIFIC REPORT TYPING

This is a budgetary item that includes salaries of two manuscript typists and certain costs for reproducing reports.

August 6, 1959

SUMMARY CONT , SCHEDULE

Investigation: **Scientific Report Typing**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	92.9	**6.9**	**6.8**	**9.3**	**8.2**	**9.9**	**10.0**	**10.2**	**10.4**	**10.5**	**10.7**
Investigation Total	**92.9**	**6.9**	**6.8**	**9.3**	**8.2**	**9.9**	**10.0**	**10.2**	**10.4**	**10.5**	**10.7**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: **Vincent A. Mackesy**

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Scientific Report Typing

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Kathleen J. Blair, Clerk-Stenographer GS-4
Dorothy Johnson Clerk-Typist GS-2

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 92.9

	FY 1959	FY 1960	FY 1961
Personal Services	7.6	7.7	7.8
Other Expenses: Within Project			
Lab. Adm. & Ser.	1.7	0.5	2.1
Lab. Total	9.3	8.2	9.9
Regional Office			
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

Recommended by:
Originator _____ Date _____

Investigation Chief Vincent A. Mackesy

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

INSTRUMENTATION

This unit has three functions, maintenance of the electronic and mechanical instruments now in use at the Laboratory, informing biologists about progress made in instrumentation in other laboratories and fields of research which may be adapted to solving their problems, and aiding biologists in the design and development of new tools.

This Laboratory now has an underwater television chain, and underwater still camera, self-contained underwater breathing apparatus, ship-to-shore radio equipment, bathythermographs, a recording temperature-depth telemeter, and several types of automatic or semi-automatic plankton and bottom samplers. All of these instruments require maintenance and repair; some need periodic calibration and occasional modification. In the past, these duties have been carried out by the biologists who used the instruments but with the increasing complexity of the gear this is no longer practical.

Progress in instrumentation is extremely rapid in all fields of research. Many tools developed elsewhere can be adapted to solving the problems of fishery biology. This unit is responsible for keeping in touch with new developments in instrumentation and informing biologists of new tools as they become available.

Traditionally, new instruments have been developed by the particular biologist who had a particular problem to solve. This system will probably continue but this unit will aid in the selection of the best materials and the most appropriate mechanism as well as in the fabrication of the prototype.

At present there is no need for a full scale, complete instrumentation unit. The ideal arrangement would include an electronic shop, a small machine shop, an electronic technician, and a machinist.

August 6, 1959

SUMMARY CONT L SCHEDULE

Investigation: **Instrumentation**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Instrumentation	**157.8**	**11.7**	**13.0**	**12.6**	**6.5**	**15.0**	**17.8**	**19.1**	**19.4**	**21.2**	**21.5**
Investigation Total	**157.8**	**11.7**	**13.0**	**12.6**	**6.5**	**15.0**	**17.8**	**19.1**	**19.4**	**21.2**	**21.5**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: **James R. Crossen** Date **8/6/59**
Recommended by: Date
Lab. Director **Herbert W. Graham**
Reg. or Area Dir.
Branch Chief
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: Instrumentation

Investigation Title:

Investigation Chief:

Project Leader: James M. Crossen Elec. Equip. Spec. GS-9
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Service Unit

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 157.8

	FY 1959	FY 1960	FY 1961
Personal Services	6.1	6.3	12.5
Other Expenses: Within Project			
Lab. Adm. & Ser.	6.5	0.2	2.5
Lab. Total	12.6	6.5	15.0
Regional Office			
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 ___

Recommended by: Date

Originator _____

Investigation Chief James M. Crossen

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

MARINE TECHNICIANS

Two Fishery Aides are currently employed for service aboard research vessels and commercial boats as required. They do routine data collecting, sampling and preservation of specimens. When not at sea, these employees work in the Laboratory tabulating data and assisting biologists on field trips.

The budget for this activity will be doubled in FY 1962 in anticipation of a stepped-up program of research aboard vessels.

August 6, 1959

SUMMARY CONT , SCHEDULE

Investigation: Marine Technicians
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	125.2	5.1	7.1	7.7	8.6	8.8	16.8	17.2	17.7	18.0	18.2
Investigation Total	125.2	5.1	7.1	7.7	8.6	8.8	16.8	17.2	17.7	18.0	18.2

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Vincent A. Mackesy Date

Recommended by:

Lab. Director Herbert A. Graham

Reg. or Area Dir.

Branch Chief

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 [illegible], 1959
File No.

Research Project Outline

Title of Project: Marine Technicians

Investigation Title:

Investigation Chief:

Project Leader:

Name	Title	Grade

Assistants: (Title and Grade)

Samuel R. Nickerson	Fish. Meth. and Equip. Spec.	GS-6
John R. Donovan	Fishery Aid (Gen.)	GS-4

Collaborators:

Need for Information:

Objective: Includes salaries and travel of marine technicians.

Method of Procedure:

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 125.2

	FY 1959	FY 1960	FY 1961
Personal Services	7.7	8.6	8.8
Other Expenses: Within Project			
Lab. Adm. & Ser.	--	--	--
Lab. Total	7.7	8.6	8.8
Regional Office			
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

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

COMMISSION ACTIVITIES

During the years 1957-1959 part of the cost of attending ICNAF and ASMFC meetings was absorbed by separate investigations. Increasing international commitments and costs of participation in other meetings require establishing a separate budget for this purpose in 1960.

August 6, 1959

SUMMARY CONT L SCHEDULE

Investigation: **Commission Activities**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Commission Activities	**81.3**	**3.0**	**2.1**	**1.9**	**9.6**	**10.3**	**10.2**	**10.8**	**10.8**	**11.3**	**11.3**
Investigation Total	**81.3**	**3.0**	**2.1**	**1.9**	**9.6**	**10.3**	**10.2**	**10.8**	**10.8**	**11.3**	**11.3**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: 8/6/59

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Commission Activities

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 81.3

	FY 1959	FY 1960	FY 1961
Personal Services	--	--	--
Other Expenses:			
Within Project			
Lab. Adm. & Ser.	1.9	9.6	10.3
Lab. Total	1.9	9.6	10.3
Regional Office			
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

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

VESSEL OPERATIONS

Field operations of this Laboratory require the use of both government-owned and chartered vessels. The government-owned vessels should include a large offshore research vessl, a medium otter trawler, a small inshore dragger, and a collecting boat for the aquarium. Kinds and sizes of chartered vessels will depend upon the specific purpose for which they are to be used.

The offshore research vessel is required for large scale quarterly synoptic surveys of the fishery resource, its food supply, and the environment in which it lives. It is also used occasionally to collect data required to solve specific problems.

The medium otter trawler is required to collect data which is to be compared directly with the various commercial fisheries. A vessel of this type can be operated offshore in all but the most severe weather at a relatively reasonable cost.

The inshore dragger is required for work in the local area and on shoal grounds.

The collecting boat is required for collecting and transporting live fish to the aquarium.

Some investigations are best served by chartered vessels equipped with standard commercial gear and manned by fishermen skilled in its use. Investigations carried out at distant ports often require local knowledge for efficient operation. It is usually less expensive to use a local vessel than to have a government-owned vessel do a good deal of unprofitable traveling.

August 6, 1959

SUMMARY CO ROL SCHEDULE

Invest on: **Vessel Operations**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Operate offshore vessel	1945.0	170	184.0	124.0	110.0	120.0	250.0	250.0	250.0	250.0	250.0
Operate OTM vessel	150.0						30.0	30.0	30.0	30.0	30.0
Operate inshore vessel	60.0							15.0	15.0	15.0	15.0
Investigation Total	2155.0	170	184.0	124.0	110.0	120.0	280.0	295.0	295.0	295.0	295.0

Annual Review		
Laboratory	Regional or Area Office	Washington Office

Prepared by: **J. A. Posgay** Date

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Vessel Operations

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: Operating expenses of offshore vessel, OTM, and inshore vessel.

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 2,155.0

	FY 1959	FY 1960	FY 1961
Personal Services			
Other Expenses:			
Within Project			
Lab. Adm. & Ser.	124.0	110.0	120.0
Lab. Total	124.0	110.0	120.0
Regional Office			
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 ___

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

STUDENT ASSISTANTS

Only one Student Assistant was employed in FY 1957, and four were engaged in 1958. In 1959, one student was retained until December. Four will be employed in 1960 and eight in 1961. Doubling the number of trainee students will be possible with our expanded Laboratory facilities and is in line with the Service's policy of student training to assure a continuing supply of young biologists bent on a career in government research laboratories.

August 6, 1959

SUMMARY CONTR SCHEDULE

Investigation: **Student Assistants**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	77.7	1.1	4.6	7.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0
Investigation Total	77.7	1.1	4.6	7.0	5.0	10.0	10.0	10.0	10.0	10.0	10.0

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: **Vincent A. Mackesy**

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Student Assistants

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: To provide an opportunity for promising university students to work at the Woods Hole Biological Laboratory on fishery problems with experienced fishery research personnel.

Method of Procedure: Individuals interested apply to Director and are selected by committee.

Phase 1:

Phase 2:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 77.7

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	7.0	5.0	10.0
Lab. Total	7.0	5.0	10.0
Regional Office	---	---	---
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

Recommended by: Date

Originator _____ _____

Investigation Chief Vincent A. Mackesy

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

PUBLIC RELATIONS

Increased interest in science and research demands the continuation of our practice of telling the Service's story to educational, fraternal, and civic groups.

August 6, 1959

SUMMARY CONTF SCHEDULE

Investigation: Public Relations
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	5.8	.2	.4	.5	.6	.6	.7	.7	.7	.7	.7
Investigation Total	5.8	.2	.4	.5	.6	.6	.7	.7	.7	.7	.7

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: Vincent A. Mackesy

Recommended by: Date

Lab. Director Herbert W. Graham

Reg. or Area Dir.

Branch Chief

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: Public Relations

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project _____

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	0.5	0.6	0.6
Lab. Total	0.5	0.6	0.6
Regional Office	---	---	---
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 ___

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

AQUARIUM AND EXHIBITS

The aquarium has not operated since the hurricane of 1954. Our 1960 budget consists of the half-time salary of an Aquarist and an amount for initial construction of basic exhibits. In 1961, when the aquarium is completed and opened to the public, a substantial budget will be required that will include $15,000 for a small boat for collecting live food and specimens and $10,000 for design and construction of display units and exhibits.

August 6, 1959

SUMMARY CONT L SCHEDULE

Investigation: **Aquarium and Exhibits**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Educational Services	**144.6**	—	—	—	**6.2**	**31.8**	**20.8**	**21.0**	**21.4**	**21.6**	**21.8**
Investigation Total	**144.6**	—	—	—	**6.2**	**31.8**	**20.8**	**21.0**	**21.4**	**21.6**	**21.8**

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: **Vincent A. Mackesy** Date **8/6/59**
Recommended by: Date
Lab. Director **Herbert W. Graham**
Reg. or Area Dir.
Branch Chief
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: Aquarium and Public Exhibits

Investigation Title:

Investigation Chief: Charles L. Wheeler

Project Leader:
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 144.6

	FY 1959	FY 1960	FY 1961
Personal Services	---	3.5	3.6
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Scr.	---	2.7	28.2
Lab. Total	---	6.2	31.8
Regional Office	---	---	---
Washington Office	---	---	---
Total			

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

Estimated Date of Completion: Phase 1 FY60 ; Phase 2 FY ; Phase 3 FY ; Project FY

Recommended by:
Originator _____ Date _____

Investigation Chief Charles L. Wheeler

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

ADMINISTRATIVE OFFICES

This item includes the salaries of the Director, the Administrative Assistant, and the Director's Secretary, plus 1/4 of the salary of the Assistant Director.

August 6, 1959

SUMMARY CONTI SCHEDULE

Investigation: Administrative Offices
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years									
		57	58	59	60	61	62	63	64	65	66
	255.2	20.2	23.8	25.4	25.1	25.7	26.3	26.8	27.1	27.3	27.5
Investigation Total	255.2	20.2	23.8	25.4	25.1	25.7	26.3	26.8	27.1	27.3	27.5

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: Vincent A. Mackesy

Recommended by: Date

Lab. Director Herbert W. Graham

Reg. or Area Dir.

Branch Chief

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: Administrative Offices

Investigation Title:

Laboratory Director:
~~Investigation Leader~~: Herbert W. Graham

Project Leader:
Name Title Grade

Assistants: (Title and Grade)

R. L. Edwards	Fishery Research Biologist	GS-12	(Part-time)
V. A. Mackesy	Administrative Assistant	GS-9	
S. H. Jones	Clerk-Stenographer	GS-5	

Collaborators:

Need for Information:

Objective: Includes salaries of laboratory director and assistants.

Method of Procedure:

Phase 1:

Phase 2:

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 255.2

	FY 1959	FY 1960	FY 1961
Personal Services	24.6	25.1	25.7
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	0.8	---	---
Lab. Total	25.4	25.1	25.7
Regional Office	---	---	---
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 ___

Recommended by:
Originator _____ Date _____
Investigation Chief _____
Laboratory Director Herbert W. Graham
Regional Director _____
Branch Chief _____
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

OTHER ADMINISTRATIVE OFFICE SERVICES

Administrative supporting elements are required at the laboratory in every area of office management; namely, procurement and supply, budget control, personnel, and general administration.

The administrative staff is organized to relieve the scientific and professional staff of all routine administrative responsibility.

August 6, 1959

SUMMARY CON OL SCHEDULE

Investigation: **Administrative Services**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Administrative Services	499.1	26.3	51.0	37.6	48.4	50.6	51.4	57.0	58.5	59.1	59.2
Investigation Total	499.1	26.3	51.0	37.6	48.4	50.6	51.4	57.0	58.5	59.1	59.2

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: **Vincent A. Mackesy** Date 8/6/59
Recommended by: Date
Lab. Director **Herbert W. Graham**
Reg. or Area Dir.
Branch Chief
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: Other Administration Office Services

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: All administrative services for the entire staff (scientific and operational) including manuscript typing, photographic and drafting services. Director's salary included in this budget.

Method of Procedure:

Phase 1: Includes salaries of all clerks and stenographers not directly assigned to a project, all purchasing, personnel work, reports and manuscript typing.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 499.1

	FY 1959	FY 1960	FY 1961
Personal Services	20.1	20.5	20.8
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	17.5	27.9	29.3
Lab. Total	37.6	48.4	50.6
Regional Office	---	---	---
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 ___

Recommended by: Date

Originator _____

Investigation Chief Vincent A. Macksey

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

MAINTENANCE OF STATION

In Fiscal Year 1957, we were still occupying the "Old Laboratory" that had been damaged by two severe hurricanes. The salt water system had been destroyed and the aquarium was not operable.

In October (F/Y 1958) our operations were moved into a private residence to make way for reconstruction of a new laboratory, shops, and public aquarium. It is anticipated that we shall occupy the new laboratory during late fall of Fiscal Year 1960 and take over the public aquarium and shops during late Fiscal Year 1960.

Our budget for Fiscal Year 1960 shows a sharp increase in this category due to anticipated expense of operating and maintaining the new laboratory as compared with our present restricted operation.

August 6, 1959

SUMMARY CONTROL SCHEDULE

Investigation: **Maintenance of Station**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Maintenance of Station	608.4	30.8	42.9	41.4	52.2	73.1	72.6	72.3	73.0	74.4	74.7
Investigation Total	608.4	30.8	42.9	41.4	52.2	73.1	72.6	72.3	73.0	74.4	74.7

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: **Vincent A. Mackesy** Date **8/6/59**

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir.

Branch Chief

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: Maintenance of station

Investigation Title:

Investigation Chief:

Project Leader:
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: General maintenance of buildings, grounds, and docks.

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 608.4

	FY 1959	FY 1960	FY 1961
Personal Services	25.0	23.8	31.7
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	16.4	28.4	41.4
Lab. Total	41.4	52.2	73.1
Regional Office	---	---	---
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 ___

Recommended by: Date

Originator _____

Investigation Chief Vincent A. Mackesy

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

CONTINGENCY FUND

Retained by the Laboratory Director to cover unexpected expenses that might occur throughout the year.

August 6, 1959

SUMMARY CONTI SCHEDULE

Investigation: Contingency Fund
Biological Laboratory: Woods Hole, Mass.

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
	30.0					5.0	5.0	5.0	5.0	5.0	5.0
Investigation Total	30.0					5.0	5.0	5.0	5.0	5.0	5.0

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by: Vincent A. Mackesy

Recommended by: Date

Lab. Director Herbert W. Graham

Reg. or Area Dir.

Branch Chief

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: Contingency Fund

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 30.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	5.0
Other Expenses:			
Within Project	---	---	---
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	5.0
Regional Office	---	---	---
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 ___

Recommended by:

Originator _____ Date _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director _____

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

SUMMARY CONTROL SCHEDULE

Investigation: **Dock Reconstruction**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Dock Reconstruction	57.0					57.0					
Investigation Total	57.0					57.0					

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Date 8/6/59

Recommended by:

Lab. Director **Herbert W. Graham**

Reg. or Area Dir. Joseph F. Pennycuick

Branch Chief Date 12-24-59

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

Dock Reconstruction

Title of Project: Completion of docks and landscaping

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective:

Method of Procedure: Install fenders and piles, relocate flagpole, complete landscaping north of Center Street.

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 57.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	57.0
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	57.0
Regional Office	---	---	---
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

Recommended by:

	Date
Originator	
Investigation Chief	
Laboratory Director Herbert W. Graham	6 AUG [illegible]
Regional Director Joseph A. Perrecher	AUG 21 1959
Branch Chief [illegible]	12-24-59

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

SUMMARY C TROL SCHEDULE

Investigation: **Laboratory Furniture**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Laboratory Furniture	87.4					87.4					
Investigation Total	87.4					87.4					

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Date 8/6/59
Recommended by: Date
Lab. Director **Herbert W. Graham**
Reg. or Area Dir. Joseph H. Simmons
Branch Chief
Approved by:
Division Chief for Director

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

Noted:
Funds not available #714 7/9/59
NHE. 12-24-59

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: Laboratory Furniture Equipment for new laboratory

Investigation Title:

Investigation Chief:

Project Leader:
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: Installation of sinks and other laboratory equipment and furniture.

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 87.4

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	87.4
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	87.4
Regional Office	---	---	---
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 61

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director Joseph H. Pennington AUG 21 1959

Branch Chief HWE. Funds not available. 11-24-59

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

#715 7/9/59

SUMMARY CC ROL SCHEDULE

Investigation: **WHOI Contract**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
WHOI Contract	760.0			80.0		180.0	100.0	100.0	100.0	100.0	100.0
Investigation Total	760.0			80.0		180.0	100.0	100.0	100.0	100.0	100.0

Annual Review

Laboratory	Regional or Area Office	Washington Office

Prepared by: Date

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir. Joseph A. Pearson

Branch Chief * NOE 12-24-57

Approved by:

Division Chief for Director

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

* under consideration no funds available for increase - 1961. may not be available for continuing contract.

#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: WHOI Contract

Investigation Title: Hydrography of the Gulf of Maine and contiguous waters.

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators: WHOI (contract)

Need for Information:

Objective: Comprehensive descriptive and dynamic hydrographic studies of Gulf of Maine circulation, temperatures, and chemical properties.

Method of Procedure:

Phase 1: Cruises, as required, by contractor, for period of at least three years.
Analysis and synthesis of data (Basic data cruise reports to follow each cruise closely.)
Preparation of final report.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 680.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	180.0
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	180.0
Regional Office	---	---	---
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 ___

Recommended by:
Originator _____ Date _____
Investigation Chief _____
Laboratory Director Herbert W. Graham
Regional Director Joseph T. Penner Chief AUG 21 1959
Branch Chief _____
Approved by:
Division Chief for Director _____

Remarks

(Continue on reverse side)

Decrease indicated in 1962 pending new FWS research vessel.
Original contract entered 6-16-55 for $200,000.00

Modification
No funds available for increase in 1961
Request to be available for following fiscal
years 62-63-64

#715 7/9/59

SUMMARY CON[illegible]L SCHEDULE

Investigation: **Offshore Vessel Design**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Offshore Vessel Design	**125.0**				**125.0**						
Investigation Total	**125.0**				**125.0**						

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by:

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir. Joseph O. Pierce

Branch Chief Date 12-14-59

Approved by:

Division Chief for Director

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

Must be delayed until funds are available.

#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: Design of research vessel

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: Required for replacement of Albatross III

Objective:

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 125.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	125.0	---
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	125.0	---
Regional Office	---	---	---
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 ___

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director Joseph F. Dunnethan

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

Phase 1 to be delayed until funds are available

#715 7/9/59

SUMMARY CONTROL SCHEDULE

Investigation: **Offshore Vessel Construction**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Offshore Vessel Construction	2000.0					2000.0					
Investigation Total	2000.0					2000.0					

Annual Review

Laboratory	Regional or Area Office	Washington Office
		Funds are in the 1961 budget request.

Date

Prepared by:

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir. Joseph L. Pimentel HWG 12-24-59

Branch Chief

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: Offshore Vessel Construction

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: Construction of new Research Vessel.

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 2000.0

	FY 1959	FY 1960	FY 1961
Personnel Services	---	---	---
Other Expenses:			
Within Project	---	---	2000.0
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	2000.0
Regional Office	---	---	---
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 ___

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director Joseph A. Pinnecchia AUG 2 1 1959

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

Funds are in the 1961 budget
Request WHE 12-24-59

#715 7/9/59

SUMMARY CO[illegible]OL SCHEDULE

Investigation: **Otter Trawl Medium (Design & Construction)**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
OTM Design & Construction	200.0					200.0					
Investigation Total	200.0					200.0					

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by:

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir. Joseph T. Dunn Acting

Branch Chief [illegible] 12-24-59

Approved by:

Division Chief for Director

*Total needed by Laboratory for Project in thousands of dollars. Funds not available in 1961.

#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: Otter Trawl, Medium (Design and Construction)

Investigation Title:

Investigation Chief:

Project Leader:
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information: A vessel of this kind can collect data offshore in all but the most severe weather at a relatively reasonable cost.

Objective: To have an OTM of about 90 ft. BP built as a research vessel.

Method of Procedure:

Phase 1: Modify the basic design of a 90-95 ft. OTM of the type being built for the New Bedford sea scallop fleet as a fishery research vessel.
Have this vessel constructed to the best modern practice.

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 200.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	200.0
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	200.0
Regional Office	---	---	---
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 ___

Recommended by: Date

Originator _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director Joseph F. Pomeroy AUG 21 1959

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

Funds not available in 1961

#715 7/9/59

SUMMARY CONTROL SCHEDULE

Investigation: **Inshore Dragger Design & Construction**
Biological Laboratory: **Woods Hole, Mass.**

Project Title	Est.* Cost	Fiscal Years 57	58	59	60	61	62	63	64	65	66
Inshore Dragger Design & Construction	**50.0**					**50.0**					
Investigation Total	**50.0**					**50.0**					

Annual Review

Laboratory	Regional or Area Office	Washington Office

Date

Prepared by:

Recommended by: Date

Lab. Director **Herbert W. Graham**

Reg. or Area Dir. Joseph D. Penrose

Branch Chief HHE 12-24-59

Approved by:

Division Chief for Director

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

Funds not available in 1961.

#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: Inshore Dragger (Design and Construction)

Investigation Title: _____

Investigation Chief: _____

Project Leader: _____
Name Title Grade

Assistants: (Title and Grade)

Collaborators:

Need for Information:

Objective: To design and construct a small dragger of shallow draft with ability to work in shallow water, bays and estuaries.

Method of Procedure:

Phase 1:

Phase 2:

Sheet No. 2 File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Laboratory for Complete Project 50.0

	FY 1959	FY 1960	FY 1961
Personal Services	---	---	---
Other Expenses:			
Within Project	---	---	50.0
	---	---	---
Lab. Adm. & Ser.	---	---	---
Lab. Total	---	---	50.0
Regional Office	---	---	---
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 ___

Recommended by:

Originator _____ Date _____

Investigation Chief _____

Laboratory Director Herbert W. Graham

Regional Director Joseph F. Pomeroy AUG 21 1959

Branch Chief _____

Approved by:

Division Chief for Director _____

Remarks

(Continue on reverse side)

Funds not available in 1961

#715 7/9/59