MARINE SKILL REPORT
SUBMITTED TO THE
UNIVERSITY OF HAWAII MARINE OPTION PROGRAM

Sorting and Curating of a Deep-Water Marine Invertebrate Collection for the Bishop Museum

DURATION

January 1, 1981 - August 31, 1981

PROJECT DIRECTOR

Dr. Dennis Devaney

COLLECTION MANAGER

Beatrice Burch

CURATORIAL ASSISTANT/TRAINEE

Alex Steele

REPORT DATE

October 15, 1981

ABSTRACT

Over the past 30 years the National Marine Fisheries Service has been building a large collection of deeper water marine invertebrates collected largely by the ship Townsend Cromwell around the Hawaiian Islands. Due to a lack of space and personnel, the NMFS has never been able to adequately store and curate the collection and it thus suffered from neglect. In January 1981 a project was begun to curate this collection and move it to the Bishop Museum. An arrangement was made to hire MOP students to participate in this project.

During the seven months I worked with the invertebrate collection of the National Marine Fisheries Service I became proficient in cataloging and labelling methods used for specimens in museum collections. Also I learned practical taxonomy, procedures for identification of invertebrates, and a great deal about the actual handling and preserving of the specimens themselves.

My duties included working with material at all stages, from initial handling of cruise material stored on shelves, through rinsing, rough sorting, labelling and in some cases up to species identifications.

At the end of my time with the project I came away not only with a great deal of practical experience, but also with a comprehensive picture of deep-water marine fauna.

TABLE OF CONTENTS

Title Page	i
Abstract	ii
List of Figures	iii
Introduction	1
TEXT	
The Proposal	1
Preliminary Survey	3
Curatorial Methods Used	4
Documentation	5
Lending Collection	6
Other Activities	6
Summary	7
Bibliography	9
MATERIALS	10
ACKNOWLEDGEMENTS	11
EVALUATION	12

LIST OF FIGURES

TABLES

Sample Benthic Work Sheet 13

Benthic Work Sheet listing number of species identified in the various groups 14

Sample Work Sheet for Cobb and Shrimp Trawl Material 15

FIGURES

Maps of station locations of the four Townsend Cromwell cruises on which the majority of the benthic material was collected.

TC - Cruise # 33 16

TC - Cruise # 35 17

TC - Cruise # 36 18

TC - Cruise # 40 19

INTRODUCTION

In the period between the 1950's and the early 1970's the National Marine Fisheries Service in Hawaii made a number of research cruises around the Hawaiian Islands. The primary purpose of these expeditions was to examine the economic potential of the deeper offshore waters. In the process of doing these studies many hundreds of dredges and trawls were made. The specimens collected in this way that did not directly relate to the work being done were pickled in formalin and stored in a warehouse behind the NMFS building on Dole Street. Over the years an impressive collection of unsorted material built up, but it was not being used and was suffering from neglect.

The suggestion was finally made that the entire collection be turned over to the Bishop Museum on condition that the Museum would agree to be responsible for all financial and personnel requirements needed to adequately manage and curate the collection. As this idea was discussed a further suggestion was made that students in the Marine Option Program of the University of Hawaii should be hired as curatorial-assistant/trainees.

THE PROPOSAL

In April of 1980 a proposal was submitted by Dr. Dennis M. Devaney, Division Head of the Invertebrate Zoology section of the Bishop Museum to the National Science Foundation. This

proposal outlined first the importance of the large and comprehensive invertebrate collection already existing at the Museum,[1] it went on to describe an opportunity to greatly expand this collection by the curating and incorporating of an assorted invertebrate collection belonging to the NMFS and stored in a warehouse behind their facilities on Dole Street. This collection, consisting of 3800 lots and estimated to contain 260,000 specimens,[2] was largely deeper water material and as such would complement the present collection at the Bishop Museum which was largely made up of shallow water specimens. The proposal called for funding to purchase and install a compact mobile shelving unit on which the invertebrate collection at the Museum could be expanded as the new material from the NMFS was incorporated. It also allowed for a variety of equipment necessary to the curating of the NMFS collection (see materials and methods), and it requested funds to hire additional staff to work curating this material, preparing it for removal to and assimilation into the Bishop Museum's collection.

The proposal was approved and funding was provided by the National Science Foundation. As outlined in the original

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[1] Invertebrate Systematic Resources Report, prepared for the National Science Foundation, 1978.
--Ranked the collection's of the Bishop Museum's division of Invertebrate Zoology among the top nine holdings in the United States.--

[2] Assessment and Inventory of the NMFS collection by Mr. William Haus. (March-May 1979)

proposal, Beatrice Burch, a biologist with many years of experience in museum work, particularly with invertebrate collections, was hired as collection manager. The proposal also called for a curatorial assistant (this position has not yet been filled), and for two part-time students as curatorial assistant/trainees. These last positions were to be filled by University of Hawaii students in the Marine Option Program. An arrangement was made to share the financial responsibility for their employment with the National Science Foundation paying a salary to one and the University of Hawaii Sea Grant Program paying a stipend to the other.

PRELIMINARY SURVEY

I first heard about the student positions in December of 1980; I began work in early January, spending several days at the Bishop Museum meeting Dr. Devaney, being shown the planned area for expansion of their collection, and being instructed in the basics of sorting and cataloging techniques by Mr. William Haus.

When the project got officially underway I worked at the laboratory/storage facilities of the NMFS on the Manoa campus of the University of Hawaii, during the first couple of weeks we were busy clearing and cleaning a working area, clearing shelving space and roughly sorting the benthic material.

In this preliminary sorting it was found that the benthic material was mostly collected by dredges and trawls made by the ship Townsend Cromwell around the Hawaiian Islands. All

specimens were stored in jars, mostly of one gallon size. No attempt had been made to separate specimens, and so a typical jar might contain starfish, sea urchins, crustaceans, corals, and mollusks all mixed together and preserved in formalin. Many of the jars had been in the warehouse for a number of years. In some jars preservative levels had gone down and specimens had deteriorated, in others labels identifying cruise and station numbers were missing or illegible.

CURATORIAL METHODS USED

Under the guidance of Beatrice Burch we began to sort this material. Jars containing starfishes and sea urchins were the first things we worked on. Dr. Devavey intended these types of organisms to be stored dry, so it was necessary to rinse out the formalin. This was accomplished by repeated draining and filling of the jars with fresh water over a period of about a week. When no trace of formalin could be detected by smell the specimens were emptied out of the jars into sorting trays and roughly sorted.

Specimens to be stored dry were laid out on newspaper and paper towels in drying boxes, they were turned daily and paper was replaced, total drying time was about two weeks. Other specimens such as crustaceans and some mollusks were stored in smaller jars and preserved in solutions of 70% isopropyl or ethyl alcohol. Smaller specimens were stored in glass vials sealed with cotton, or in small Zip-Loc bags and clear plastic boxes.

Simple labels were written to go with the different groups separated out, containing cruise and station numbers and the vessel's name, as well as a general taxanomic identification, e.g., Asteroidea, Ophiuroidea, Echinoidea, etc. At the same time an index card was prepared to go with each label, this contained the same information as above, and as well the number of specimens, how they were stored, i.e., wet or dry or in vials, and any miscellaneous information. These index cards were stored in a filing system to aid in later retrieval of specimens for more precise identification.

In addition to labels and filing cards, records were also kept of numbers of specimens of each group found at particular stations. These were separated into the individual cruises and arranged in order ot station number. (see attached example). In some cases a station would consist of only one jar and only a few specimens, in other cases five or more jars containing hundreds of specimens would exist for a station.

After specimens were sorted and labelled and catalogued they were placed on cleared shelves in another section of the warehouse. The shelves were labelled according to the groups and categories in the filing system and thus similar specimens from different stations and cruises were all grouped together.

DOCUMENTATION

From the NMFS files we were able to obtain the narrative and cruise reports for the cruises from which we had specimens,

in some cases it was necessary to go through the deck logs also in order to get specific information such as latitudes and longitudes of stations. From these reports it was also possible to get depths at which stations were made, and also the type of trawl or dredge used.

Stations from the four Townsend Cromwell cruises which made up the majority of the benthic material were plotted on a large chart of the major Hawaiian Islands and marked with colored dots on clear sheets of acrylic. These gave a clear picture of the range of each of the cruises. They also helped to point out suspect longitudes and latitudes for several stations.

LENDING COLLECTION

As mentioned earlier some of the jars had no labels or were missing cruise or station numbers, this made them unusable in the collection since without this information no pertinent data could be found concerning the specimens. All specimens in these jars were sorted in the same manner as those in properly labelled jars, but they were separated into a "lending collection" to be used for educational purposes.

OTHER ACTIVITIES

Other things done in addition to the basic sorting already described include making copies of large parts of earlier expeditionary reports such as the Dana and Challenger expeditions,

and also of monographs dealing with phyla found in the NMFS collection.

Dissecting scopes were used frequently to sort smaller specimens, and to allow removal of pedicellaria from starfishes and sea urchins. In addition, Beatrice Burch, assisted by Dr. Philip Papish, sorted bottom sediments from a number of areas, identifying several hundred species of forams.

An exhibit outlining the sorting methods we were using was prepared for the UH Ocean Fair in April. Also a collection of invertebrates was made from the hull of the Falls of Clyde when it was put into dry dock.

SUMMARY

Altogether benthic material from twenty cruises was sorted, the majority of these were Townsend Cromwell cruises, but some material was found from C.H. Gilbert and Hugh M. Smith cruises. Most material was taken offshore in 100 to 300 fathoms in areas already tested by the Albatross.

The specimens from the 160 stations sorted broke down to 4100 taxa. Species level identifications were made in corals, asteroidea, and molusca, with 445 species identified.

At the end of six months we had completed a preliminary separation of all benthic material in the National Marine Fisheries Service collection. We next began work on mid-water material. During the seventh and last month I worked at the NMFS lab we began preparing to sort the jars of midwater

material. Several randomly picked gallon jars were sorted and from these a specimen data sheet was prepared (see attached sample) listing all the phyla we encountered. Counting and separating techniques were improved with new forceps and mechanical counters. The rest of the Cobb and Shrimp Trawl material we arranged by cruise and station number on the shelves left vacant after the benthic material was sorted.

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MATERIALS

The Grant allotted by the National Science Foundation for the curating, moving and assimilation of the NMFS invertebrate collection into the Bishop Museum amounts to $228,037. It was designed to support the project for 3 years, starting from October 1980.

This grant at present pays the:

1. Salary of full-time collection manager;
2. Salary for two part-time MOP students (it also allows for a full-time curatorial assistant, not yet hired).

As well, the grant has covered the cost of:

1. Compact mobile shelving units on which the collection will be stored at the Bishop Museum;
2. A dehumidifier for the new collection room.

Finally, the grant allows for all the miscellaneous equipment and supplies needed for the project. In my case, this included:

1. Two dissecting microscopes;
2. Jars, vials, sealing tape, cardboard set-up boxes, forceps, etc.;
3. 3x5 cards, file folders and boxes;
4. xeroxing costs.

The NMFS provided us with a work space in their warehouse to curate the collection, and with ethyl alcohol to preserve specimens.

Stipends for two Marine Option Program students were provided by Sea Grant.

ACKNOWLEDGEMENTS

A number of people and organizations made possible my seven months of work on the NMFS collection. I should first acknowlwdge the support of the National Science Foundation, who made the whole idea of consolidating the NMFS collection into the Bishop Museum possible. Next I must thank Dr. Dennis M. Devaney, Division Head, Invertebrate Zoology at the Bishop Museum; and Mr. William Haus, a curatorial assistant in the Invertebrate Zoology Department of the Museum, for their instruction and help at the outset of the project. During my seven months with the project I was generously supported by a stipend provided by Sea Grant through the Marine Option Program. This was arranged by Sherwood Maynard, Director of the Marine Options Program, who also assisted me in the preparation of my original proposal.

In our work space at the NMFS lab we were cordially treated by all the staff, and all the facilities we required were made available to us.

While at the NMFS I worked with and enoyed the company of a number of other curatorial assistant trainees: Annette Young, Allison Chun, Laura Knight, Corey Komatsu and Kevin Seitz.

My special thanks must go to Mrs. Beatrice Burch, collection manager for the project. Her experience at the Smithsonian and with her personal collections provided the ideal background for this job. She was a constant source of information relating to all aspects of the collection and its curating, and it was a great pleasure to work with her.

EVALUATION

Before I took the position as a part-time curatorial assistant at the NMFS, my background in invertebrate zoology consisted of knowledge picked up through diving and aquarium collecting, and one 310 level invertebrate zoology course taken at U.H. Manoa. The NMFS position offered an ideal situation to learn a great deal of taxonomy, and over the seven months I worked on the collection I have greatly increased my knowledge of zoological taxonomy.

I enjoyed the many aspects of curatorial work which I was involved with, and feel that the opportunity to work first hand with so many specimens of such a wide range of groups as were contained in the NMFS collection was very valuable.

NATIONAL MARINE FISHERIES--BP BISHOP MUSEUM

Benthic Work Sheet

Date 11-9-67
Area Kahoolawe
Gear Semi-balloon trawl

Cruise/Sta. TC 33 St. 38
Depth m. 166 fms.
vol. sample 2 gal., 2 qts

Length drag (mi.) —
Duration drag (min.) 10

Total specimens ± 2800 condition good ✓ poor__ satisfactory __
Total species (approximate) 65 ± 50 forams

Forams.	(species ± 50)	Mysidacea		Coralliophilidae	
Miniacina		Isopoda		Cymatiidae	
Carpenteria	124	Amphipoda		Fasciolariidae	
~~Paranomalina~~ Baculogypsina	10	Cumacea		Muricidae	
Porifera		Scyllaridea		Nassariidae	
Hydroida		Palinuridea		Naticidae	
Scyphistoma		Stomatopoda		Terebridae	
Alcyonacea		Natantia	2	Tonnidae	
Gorgonacea		Callianassidae		Turridae	
Pennatulacea		Axiidae		Opisthobranchia	
Actiniaria		Paguridea	43	Nudibranchia	
"Stylobates"		Galatheidea	105		
Madreoporaria	1401	Porcellanidae			
		Lithodidae			
				Bivalvia	73 (10 species)
		Brachyura		Arcidae	
Zoanthidea		Calappidae		Cardiidae	
Antipatharia	1	Cancridae		Glycymeridae	
Platyhelminthes		Dorippidae		Ostreidae	
Nemertinea		Dromidae		Pectinidae	
Nematoda		Dynomenidae		Pinnidae	
Polychaeta	2	Goneplacidae		Verticordiidae	
		Grapsidae			
		Homolidae			
Bryozoa		Latreillidae			
		Leucosiidae	216		
Brachiopoda	237	Majidae	49		
Echiuroidea		Ocypodidae			
Sipuncula		Parthenopidae			
Crinoidea		Pinnotheridae		Wood with organisms	✓
Asteroidea	11	Portunidae		Serpulids on Glycym.	✓
		Raninidae	2	Serpulids on Xenophora	✓
				Sandy polychaetes on "	✓
Ophiuroidea	3			Sandy polychaetes on Glycymeridae	✓
Echinoidea	14	Polyplacophora		Arcas on Xenophora	✓
		Scaphopoda	385	On echinoid spines Barnacles	✓
Holothuroidea		Cephalopoda		Barnacles on Xenophora	
Ascidiacea		Octopoda		Brachiopods on Xenophora	
		Decapoda		Gut contents in Astropect	
Pycongonida				Stylifers in Astropect	
Cirripedia	102				
		Gastropoda	174 (25 species)		
		Architectonidae			
Ostracoda		Conidae			
Cladocera		Eulimidae			

Comments: Fine brachiopods - well preserved soft parts
Corals seem small & so are Leucosidae
Much sediment to sort

Date
Area Kahoolawe
Cruise/Sta. 33/38
Lat. 20° 38.1' N Long. 156° 41.1' W

BLB281

NATIONAL MARINE FISHERIES--BP BISHOP MUSEUM

Benthic Work Sheet

Date | Cruise/Sta. | Length drag (mi.)
Area | Depth m. fms. | Duration drag (min.)
Gear | vol. sample

Total specimens condition good __ poor__ satisfactory __
Total species (approximate) 445

	# SPECIES				
Forams.	100 ±	Mysidacea		Coralliophillidae	
Miniacina		Isopoda	2	Cymatiidae	
Carpenteria		Amphipoda	1	Fasciolariidae	
Paranomalina		Cumacea		Muricidae	
Porifera	10	Scyllaridea	3	Nassariidae	
Hydroida	8	Palinuridea	1	Naticidae	
Scyphistoma	1	Stomatopoda	5	Terebridae	
Alcyonacea	5	Natantia	10	Tonnidae	
Gorgonacea	2	Callianassidae	1	Turridae	
Pennatulacea	10	Axiidae		Opisthobranchia	
Actiniaria	8	Paguridea	7	Nudibranchia	
"Stylobates"	1	Galatheidea	2		
Madreoporaria	24	Porcellanidae			
		Lithodidae	1 ±		
				Bivalvia	24
Telestacea	1	Brachyura		Arcidae	
Zoanthidea	3	Calappidae	4	Cardiidae	
Antipatharia	1	Cancridae		Glycymeridae	
Platyhelminthes		Dorippidae	1	Ostreidae	
Nemertinea	1	Dromidae		Pectinidae	
Nematoda		Dynomenidae		Pinnidae	
Polychaeta	10	Goneplacidae	1?	Verticordiidae	
		Grapsidae	1		
		Homolidae	2		
Bryozoa	30	Latreillidae	2		
		Leucosiidae	4		
Brachiopoda	5	Majidae	5		
Echiuroidea		Ocypodidae			
Sipuncula	2	Parthenopidae	1		
Crinoidea	3	Pinnotheridae		Wood with organisms	
Asteroidea	30	Portunidae	4	Serpulids on Glycym.	
		Raninidae	2	Serpulids on Xenophora	
				Sandy polychaetes on "	
Ophiuroidea	10			Sandy polychaetes on	
Echinoidea	45	Polyplacophora	1	Glycymeridae	
		Scaphopoda	3	Arcas on Xenophora	
				On echinoid spines	
Holothuroidea	4	Cephalopoda		Barnacles on Xenophora	
Ascidiacea	1	Octopoda		Brachiopods on Xenophora	
		Decapoda SQUID	2	Gut contents in Astropect	
Pycongonida	1	Cuttle fish	1	Stylifers in Astropect	
Cirripedia	7				
		Gastropoda	43		
Tanaida	1	Architectonidae			
Ostracoda	1	Conidae			
Cladocera		Eulimidae			

Comments:

Date
Area
Cruise/Sta.
Lat.
Long.

species as of 7/81 BLB281

BISHOP MUSEUM--NATIONAL MARINE FISHERIES SERVICE

COBB AND SHRIMP TRAWL

Cruise Sta. Date Locale
Depth

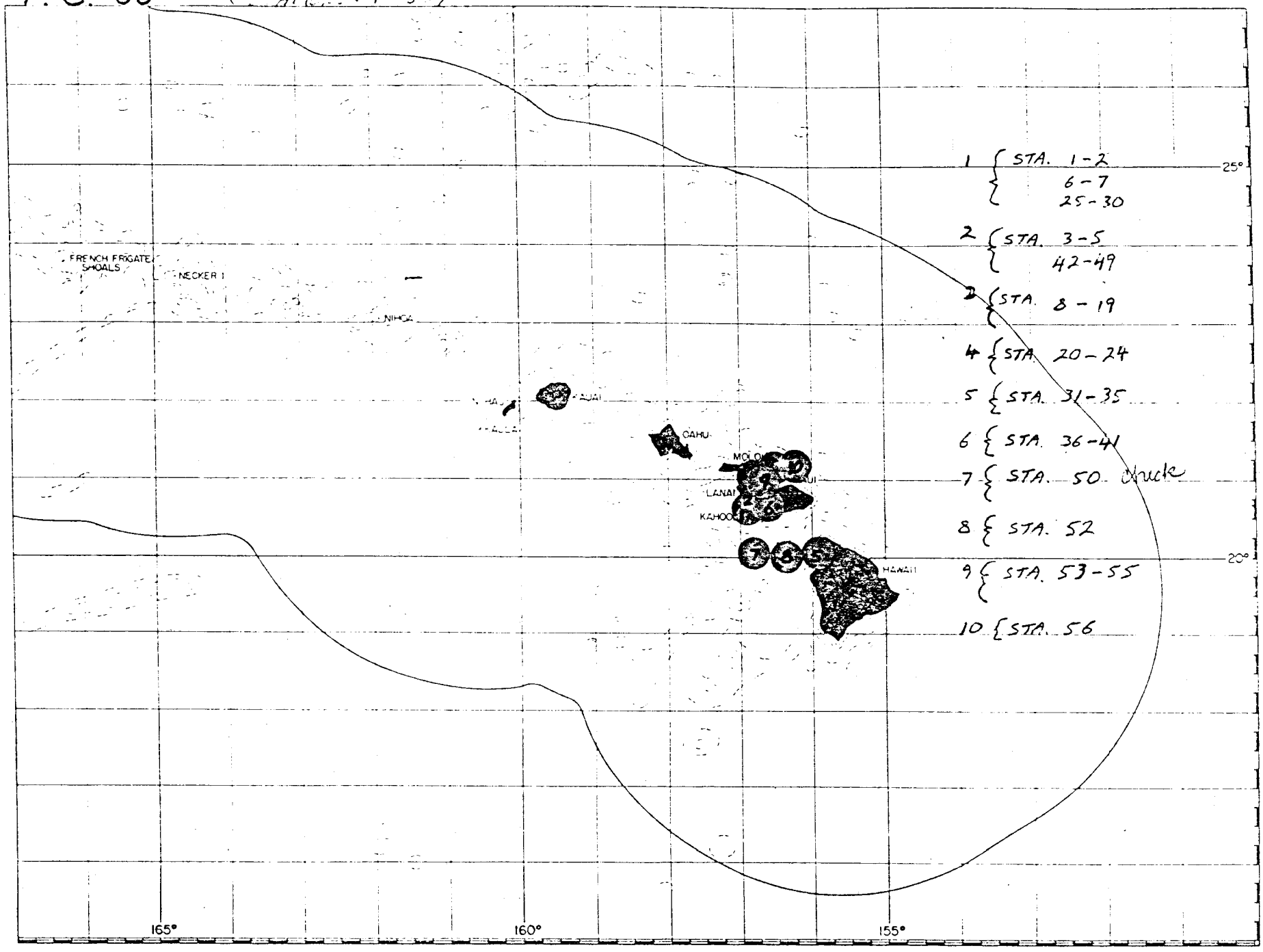
vol. fluid and plankton aliquot sorted
aliquot shipped

vol. plankton aliquot retained

	from entire sample	from aliquot sample
Medusae		
Siphonophora		
Ctenophora		
Nemertinea		
Polychaeta		
Cirripedia		
Cladocera		
Copepoda		
Ostracoda		
Amphipoda--Gammaridea		
Amphipoda--Hyperiidea		
Phoronima		
Cystosoma		
Isopoda		
Mysidacea		
Stomatopoda juv.		
Zoea		
Alima		
Euphausiacea		
Penaeidea		
Mysis		
Lucifer		
Caridea		
Natantia		
Phyllosoma		
Galatheidea		
Porcellanidea		
Brachyura		
Zoea		
Megalops		
Chaetognatha		
Larvacea		
Doliolidae		
Salpidae		
Gastropoda		
Heteropoda		
Pteropoda		
Cephalopoda		
Fish		
Nematoda		

BLB 781

I. C-33 (STATIONS 1-55)



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4 { STA. 20-24
5 { STA. 31-35
6 { STA. 36-41
7 { STA. 50 Ahuke
8 { STA. 52
9 { STA. 53-55
10 { STA. 56

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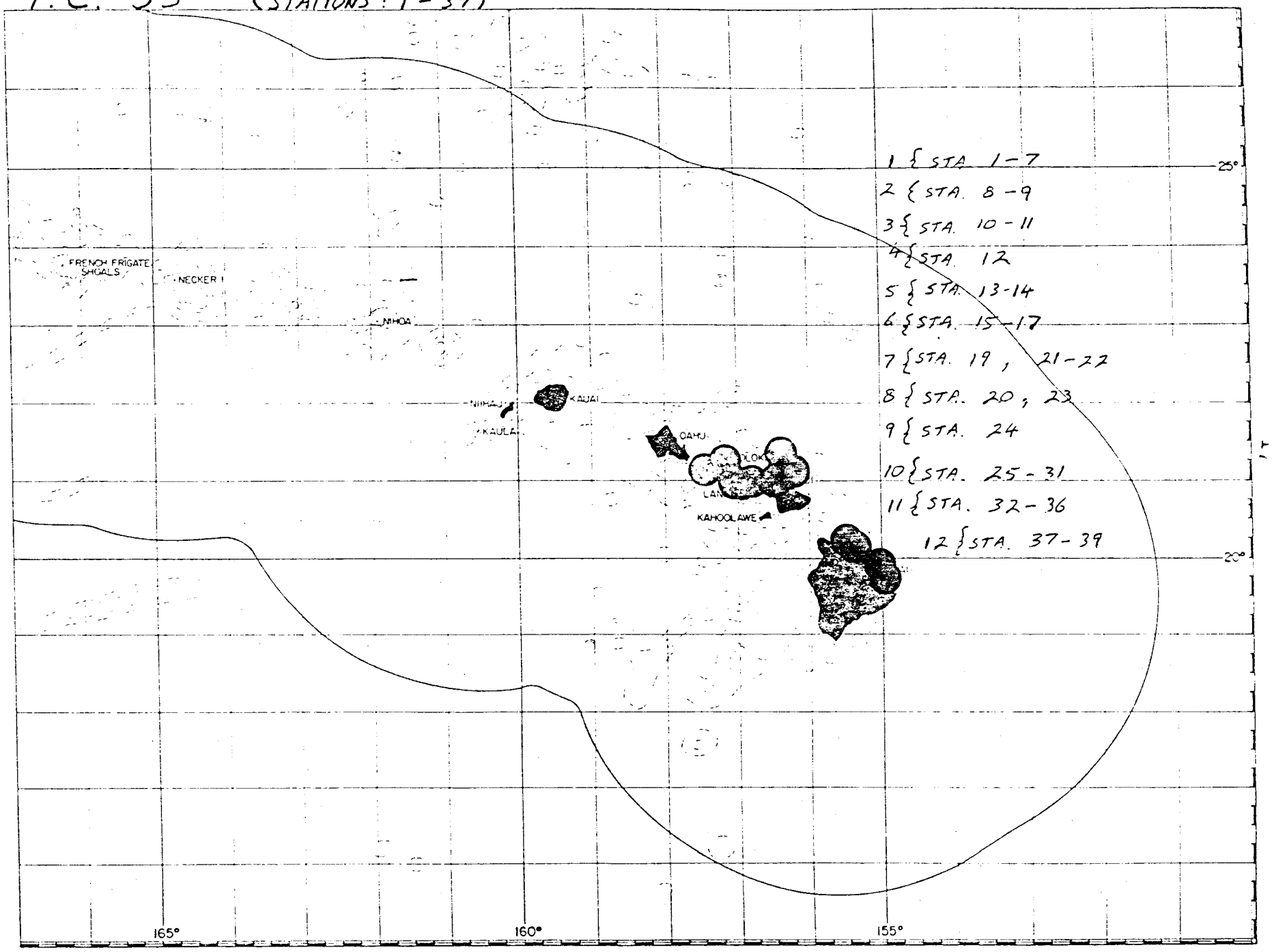

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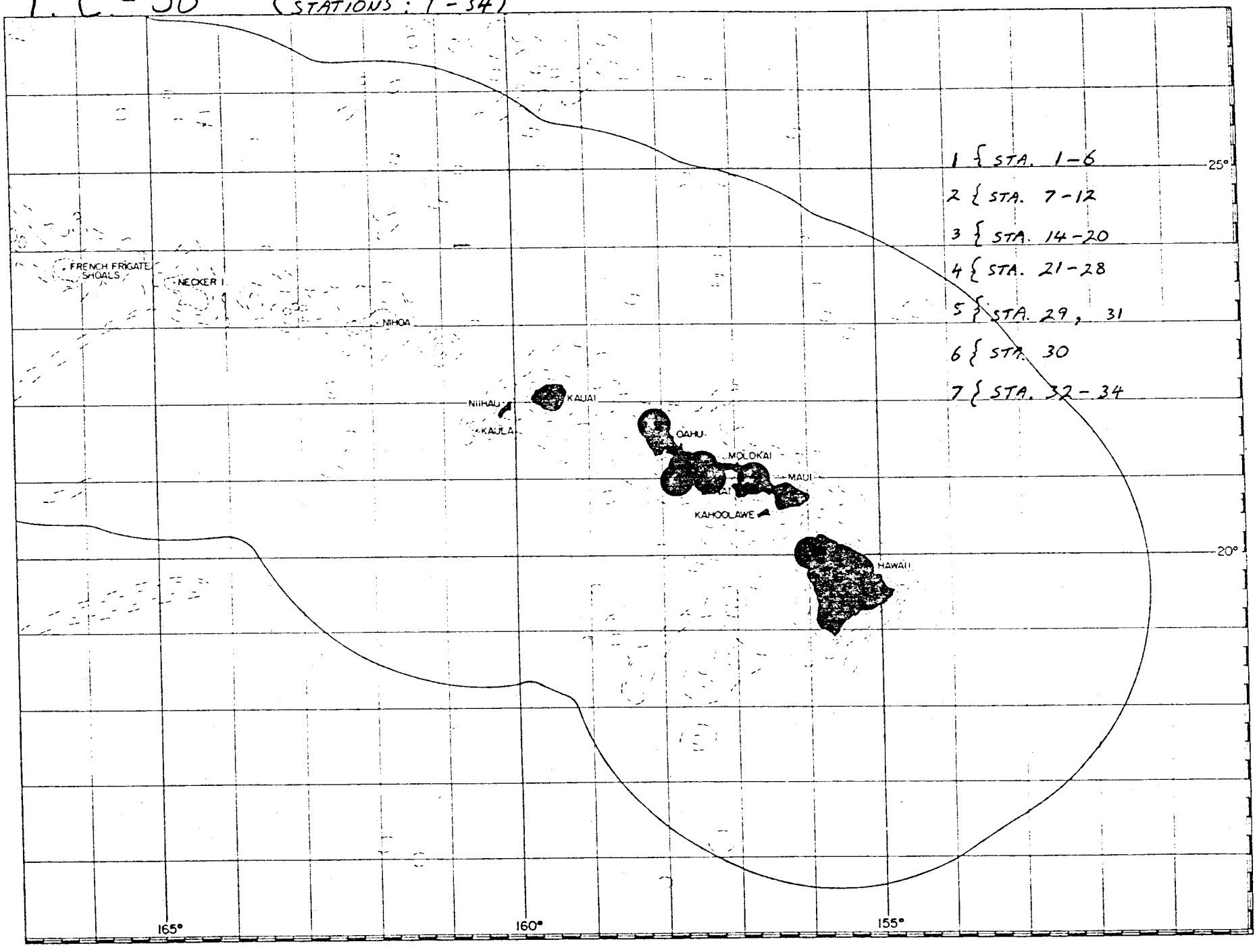

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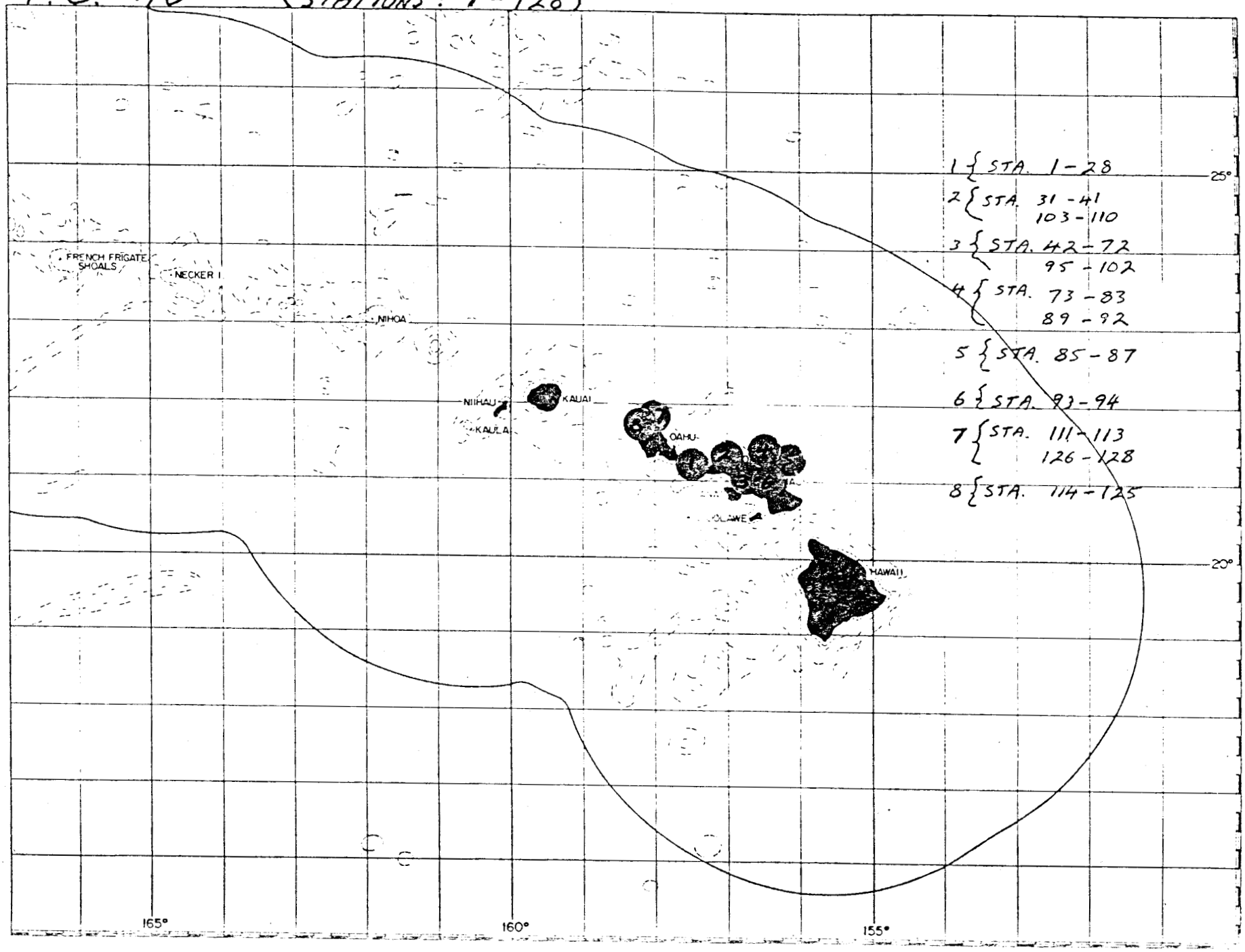

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3 { STA. 42-72, 95-102
4 { STA. 73-83, 89-92
5 { STA. 85-87
6 { STA. 93-94
7 { STA. 111-113, 126-128
8 { STA. 114-125

DESCRIPTION OF SLIDES

#1. A Marine Option Program student, curatorial assistant/ trainee, sorting mid-water material at the NMFS lab.

#2. Collection Manager Beatrice Burch identifying specimens at the NMFS lab.

#3. Work area at the NMFS lab, showing specimens laid out to dry in the foreground, and jars of unsorted material being rinsed in the background next to the sinks.