

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

BATCH #18

1. SUBJECT
CLASSI-
FICATION

A. PRIMARY

Agriculture

AM00-0000-G750

B. SECONDARY

Fisheries--Thailand

2. TITLE AND SUBTITLE

Inland fisheries progress in Thailand 1971

3. AUTHOR(S)

Swingle, H.S.; Shell, E.W.

4. DOCUMENT DATE

1972

5. NUMBER OF PAGES

116p.

6. ARC NUMBER

ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS

Auburn

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)

9. ABSTRACT

10. CONTROL NUMBER

PN-RAA-965

11. PRICE OF DOCUMENT

12. DESCRIPTORS

**Fresh water fishes
Thailand**

13. PROJECT NUMBER

14. CONTRACT NUMBER
CSD-2270 GTS

15. TYPE OF DOCUMENT

**INLAND FISHERIES PROGRESS
IN THAILAND**

1971

by

**H. S. Swingle
E. W. Shell
International Center for Aquaculture
Auburn University
Auburn, Alabama 36830**

**Project: A.I.D./csd-2270, T.O. 7 Date: January 15, 1972
USOM/Thailand PIOT 493-180.7-3-10095**

TABLE OF CONTENTS

	<u>page</u>
SPECIES OF FISHES CAPTURED OR CULTURED IN THAILAND.....	1
ITINERARY.....	3
1.0 RECOMMENDATIONS.....	5
2.0 HIGHLIGHTS OF RESEARCH RESULTS 1971.....	10
2.01 <u>Village Reservoir Management</u>	10
2.011 Nam San Kam Reservoir.....	10
2.012 Nong Bua Reservoir.....	10
2.02 <u>Other Village Reservoirs in Which Research is in Progress</u>	11
2.021 Bor Paep Village Reservoir.....	11
2.022 Nong Takran Reservoir.....	12
2.023 Ped Village Reservoir.....	13
2.024 Ban Tum Reservoir.....	13
2.03 <u>Efficiency of Various Species of Fish</u>	14
2.031 Relative Efficiency of Pla Nin and Pla Nai.....	14
2.032 Experiments at Nong Khai.....	14
2.033 Production of Pla Nin with Feed and Fertilizer at Tak.....	15
2.034 Relative Efficiency of Pla Salid and Pla Nai at Khon Kaen.....	16
2.035 Production of the Air-Breather, <u>Anabas testudineus</u> (Pla Mor), at Bangkhen.....	16
2.036 Other Species Being Tested.....	17
2.04 <u>Combined Rice and Fish Culture</u>	18
2.05 <u>Cage Culture of Fish</u>	19
2.06 <u>Pen Culture</u>	19
2.07 <u>Macrobrachium rosenbergii Shrimp Culture</u>	20

Table of Contents--Continued	<u>page</u>
3.0 SUMMARY OF PROGRESS IN EXTENSION.....	21
3.01 <u>Fishculture in Rice Fields</u>	21
3.02 <u>Fishculture in Ponds</u>	21
3.03 <u>Cage Culture</u>	22
3.04 <u>Ditch Culture</u>	22
3.05 <u>Fishes for Culture</u>	22
4.0 RESEARCH PROJECTS IN 1971.....	23
4.01 <u>Culture of Fishes in Cages</u>	23
4.02 <u>Culture of Fishes in Pens</u>	23
4.03 <u>Culture of Fishes in Ponds</u>	23
4.04 <u>Culture of Marine and Brackishwater Fishes</u>	23
4.05 <u>Culture of Fishes in Rice Paddies</u>	23
4.06 <u>Culture of Crabs and Molluscs</u>	23
4.07 <u>Culture of Shrimps in Ponds</u>	23
4.08 <u>Diseases of Fishes</u>	23
4.09 <u>Feeds and Feeding</u>	23
4.10 <u>Life History</u>	23
4.11 <u>River Pollution</u>	23
4.12 <u>Spawning of Fishes</u>	23
4.13 <u>Surveys and Studies of Impoundments and Streams</u>	23
<u>Fisheries Surveys and Studies on Reservoirs and</u>	
<u>Swamps</u>	23
<u>Fisheries Surveys and Studies on Rivers</u>	23
<u>Fisheries Surveys and Studies on Irrigation Tanks</u>	
<u>and Village Ponds</u>	23
4.14 <u>Taxonomy</u>	23
4.15 <u>Miscellaneous</u>	23
5.0 PARASITES AFFECTING FISH AND MAN.....	24
5.01 <u>Organisms in Reservoirs that Cause Dermatitis in Man</u> ..	24
6.0 PROBLEMS ARISING IN CULTURE AND MARKETING OF PLA SALID.....	25
7.0 PROBLEMS ARISING IN CULTURE OF PLA DUK DAN.....	26

Table of Contents--Continued	<u>page</u>
8.0 HATCHERY PRODUCTION AND FISH DISTRIBUTION.....	28
8.01 <u>Need for Larger Fingerling Fishes</u>	28
8.02 <u>Summary of Production and Distribution of Fishes for Stocking in 1971</u>	29
APPENDIX.....	30
9.0 THE DEPARTMENT OF FISHERIES.....	31
9.01 <u>The Five-Year Agriculture and Fisheries Development Plan</u>	31
9.02 <u>The Inland Fisheries Hatchery and Research Facilities</u>	32
10.0 TITLES OF CURRENT FISHERIES RESEARCH PROJECTS AND THOSE RECENTLY COMPLETED.....	34
10.01 <u>Culture of Fishes in Cages</u>	34
10.02 <u>Culture of Fishes in Pens</u>	35
10.03 <u>Culture of Fishes in Ponds</u>	35
10.04 <u>Culture of Marine and Brackishwater Fishes</u>	37
10.05 <u>Culture of Fishes in Rice Paddies</u>	37
10.06 <u>Culture of Crabs and Molluscs</u>	38
10.07 <u>Culture of Shrimps in Ponds</u>	38
10.08 <u>Diseases of Fishes</u>	39
10.09 <u>Feeds and Feeding</u>	39
10.10 <u>Life History</u>	40
10.11 <u>River Pollution</u>	43
10.12 <u>Spawning of Fishes</u>	43
10.13 <u>Surveys and Studies of Impoundments and Streams</u>	44
<u>Fisheries Surveys and Studies on Reservoirs and Swamps</u>	44
<u>Fisheries Surveys and Studies on Rivers</u>	46
<u>Fisheries Surveys and Studies on Irrigation Tanks and Village Ponds</u>	46
10.14 <u>Taxonomy</u>	47
10.15 <u>Miscellaneous</u>	48
11.0 SYNOPSIS OF PHYSICAL AND BIOLOGICAL DATA FOR THE FISHERIES UNITS AND THE FISHERIES RESEARCH STATIONS....	50
11.01 <u>The Units Located at Bangkok</u>	50
11.011 Fishery Biology Survey Unit.....	50
11.012 Inland Fisheries Stations Section.....	51

Table of Contents--Continued

	<u>page</u>
11.013 Taxonomy Unit.....	51
11.014 Inland Fisheries Mobile Unit.....	52
11.015 Extension Section.....	52
11.016 Estuarine Fisheries Mobile Unit.....	53
11.017 Engineering Section.....	54
11.018 Research and Extension Unit for Coastal Culture of Oysters and Crabs.....	54
 11.02 <u>Fisheries Stations in North Thailand</u>	 55
11.021 Chiang Mai.....	55
11.022 Chiang Rai.....	58
11.023 Tak.....	61
 11.03 <u>Fisheries Stations in Northeast Thailand</u>	 64
11.031 Huey Sithon Fisheries Research and Demonstration Unit.....	 64
11.032 Khon Kaen.....	65
11.033 Maha Sarakham.....	69
11.034 Nakhon Ratchasima.....	72
11.035 Nong Khai.....	75
11.036 Northeast Agricultural Center Fisheries Unit...	78
11.037 Sakon Nakhon.....	79
11.038 Surin.....	82
11.039 Ubon Ratana Reservoir.....	85
11.040 Ubon Ratchathani.....	87
11.041 Udon Thani.....	90
 11.04 <u>Fisheries Stations in Central Thailand</u>	 93
11.041 Bangkhen.....	93
11.042 Chai Nat.....	95
11.043 Nakhon Sawan.....	98
 11.05 Fisheries Station in South Thailand.....	 101
11.051 Chanthaburi.....	101
11.052 Pattani.....	103
11.053 Prachuap Khiri Khan.....	105
 12.0 FISHERIES STATISTICS.....	 108
12.01 <u>Catch of fish in tons, 1961 - 1969</u>	108
12.02 <u>Sale price (baht/kg) of freshwater fish at Bangkok Auction, 1964 - 1969</u>	108

Table of Contents--Continued

	<u>page</u>
12.03	<u>Freshwater fish and prawn catch in 1967, 1968,</u> <u>and 1969 (in tons).....</u> 109
12.04	<u>Uses of freshwater fishes and shrimps.....</u> 109
12.05	<u>Shrimp Culture in Thailand (Summary).....</u> 110
12.06	<u>Export - Import of Fish 1969.....</u> 110
12.07	<u>Extension: Number of fish farmers, area cultured</u> <u>and number of fish stocked, 1969.....</u> 110

FISH SPECIES CAPTURED OR CULTURED IN THAILAND

<u>Scientific name</u>	<u>Common name</u>	<u>Thai name</u>
<u>Anabas testudineus</u>	Climbing perch	Pla Mor Thai
<u>Aristichthys nobilis</u>	Bighead carp	Pla Soong-Hue
<u>Betta splendens</u>	Fighting fish	Pla Kat
<u>Catlocarpio siamensis</u>		Pla Kaho
<u>Chanos chanos</u>	Milkfish	Pla Nuan Chan Thale
<u>Cirrhinus jullieni</u>		Pla Sai
<u>C. microlepis</u>		Pla Nuan Chan
<u>Clarias batrachus</u>	Walking catfish	Pla Duk Dan
<u>C. macrocephalus</u>		Pla Duk Uey
<u>Ctenopharyngodon idella</u>	Grass carp	Pla Choa-Hue
<u>Cyclocheilichthys apogon</u>		Pla Sai Tan
<u>C. enoplos</u>		Pla Takok
<u>Cyprinus carpio</u>	Common carp	Pla Nai
<u>Dangila sp.</u>		Pla Sa
<u>Datnioides microlepis</u>	Tiger fish	Pla Seuwa Taw
<u>Hampala dispar</u>		Pla Soot
<u>H. macrolepidota</u>		Pla Kasoop
<u>Heleostoma temminckii</u>	Kissing goramy	Pla Mortan
<u>Hypophthalmichthys molitrix</u>	Silver carp	Pla Lin-Hue
<u>Kriptopterus bleekeri</u>		Pla Dang
<u>Lates calcarifer</u>	Sea bass	Pla Kapong
<u>Leptobarbus hoevenii</u>		Pla Ba
<u>Morulius chrysophekadion</u>	Crow fish	Pla Ka
<u>Mystus sp.</u>		Pla Kayeng
<u>Notopterus chitala</u>		Pla Krai
<u>N. notopterus</u>		Pla Chalot
<u>Ompok bimaculatus</u>		Pla Cha Oan
<u>Ophicephalus gachua</u>		Pla Kang
<u>O. micropeltes</u>		Pla Chado
<u>O. striatus</u>	Snakehead	Pla Chon
<u>Osphronemus goramy</u>	Giant goramy	Pla Ret
<u>Osteochilus hasselti</u>	Nilem	Pla Soi Nok Khao
<u>Pangasianodon gigas</u>	Royal fish	Pla Buk
<u>Pangasius larraudii</u>		Pla Tepo
<u>P. sutchi</u>		Pla Sawai
<u>Pristolepis fasciatus</u>		Pla Mor Chang Yieb
<u>Probarbus jullieni</u>		Pla Yeesok
<u>P. leptobarbus</u>		
<u>Prophagorus nieuhoi</u>		Pla Duk Lumpan
<u>Puntius daruphani</u>		Pla Tapak
<u>P. gonionotus</u>	Puntius	Pla Tapien Khao
<u>P. proctoysron</u>		Pla Mang
<u>Rasbora sp.</u>		Pla Siew
<u>Tilapia melanopleura</u>	Congo tilapia	Pla Khang Lai

<u>Scientific name</u>	<u>Common name</u>	<u>Thai name</u>
<u>Tilapia mossambica</u>	Java tilapia	Pla Morted
<u>T. nilotica</u>	Nile tilapia	Pla Nin
<u>Trichogaster pectoralis</u>	Sepat Siam	Pla Salid
<u>Wallagonia attu</u>		Pla Khao
<u>Wallago dinema</u>		Pla Biew
<u>Tor tambroides</u>		Pla Wien
<u>Puntius orphoides</u>		Pla Kam Cham
<u>Pangasius sanitwongsei</u>		Plan Thepa
<u>Ophicephalus marulius</u>		Pla Chon Ngu Hao
<u>Oxyeleotris marmoratus</u>	Sand goby	Pla Bu Sai
<u>Fluta alba</u>		Pla Lai

MONETARY UNITS OF THAILAND

100 satangs = 1 baht (\$0.05 U.S.)
20 baht = \$1.00 U.S.

UNITS OF AREA IN THAILAND

1 rai is equal to 1,600 square meters (.16 hectare) or 0.4 acre.

ITINERARY FOR THAILAND
October 9 through November 5, 1971

- October 9 Arrived Bangkok
- October 11-13 Conferences with USOM, Director of Inland Fisheries and the Director-General of Department of Fisheries; reviewed research and extension at Bangkhen Station; lectured on reservoir fisheries.
- October 14-19 Northeast
- Reviewed research and extension at the Nong Khai, Khon Kaen, and Ubon Ratana Reservoir Stations; lectured on fish populations dynamics in reservoirs and sampling methods in reservoirs; reviewed research at Northeast Agricultural Center; lectured on statistical treatment of research data; visited commercial fish farms and village reservoir projects; reviewed research and extension at Maha Sarakham Station and at Huey Sithon Unit; lectured to biologists and extension personnel from all Northeast stations on: fish nutrition and fish feeds, anatomy and physiology of fishes, research needed to develop fish cultures, and methods of calculating the standing crop and rates of feeding.
- October 20-21 Surveyed research projects at Bangkhen Station near Bangkok.
- October 22-27 North
- Reviewed research and extension at Nakhon Sawan, Chai Nat, Tak, and Chiang Mai Stations; lectured to biologists from all North stations on: feeds, feeding, nutrition, anatomy and physiology of fish, methods of research needed to develop fish cultures, rate of stocking, and rates of feeding.
- October 28-
November 4 Conferences with Heads of Fisheries Units, Extension Units, and members of the fisheries research planning committee; discussed development of a 5-year program of research and extension; worked with Bangkhen Station biologists on use of fish pelleting machine and repair of scientific equipment; lectured to biologists from Central and South stations on: feeds, fish nutrition, physiology, research procedures for developing fish cultures.

November 5 Reported to USOM and to the Director-General of the
Department of Fisheries in Bangkok.

November 6 Departed Bangkok, Thailand.

1.0 RECOMMENDATIONS

1.01 The following recommendations are based on the discussions with the personnel of the Department of Fisheries; upon the results of research at the Inland Fisheries Stations; and upon discussions with extension personnel concerning the effectiveness of their program and problems encountered in teaching farmers improved methods of fish culture.

1.02 Since no one fisheries stations has enough ponds, the research program to develop more efficient systems of fish culture must be coordinated by the central office to most effectively use the 126 freshwater and 34 brackish-water ponds available in the following areas:

<u>Freshwater Ponds</u>	<u>Number</u>
Northeast	59
North	24
Central	29
South	<u>14</u>
Total	126

Brackishwater Ponds (in South Thailand only)

Prachuap Khiri Khan	20
Chanthaburi	<u>14</u>
Total	34

1.03 At the freshwater inland fisheries stations, research emphasis should be upon the rapid development of efficient systems of fish culture that can be used by farmers to culture fish in ponds. Lack of such information hampers the effectiveness of the extension program.

1.04 At the brackishwater fisheries stations, research emphasis should be upon developing improved cultures for shrimps, sea bass, and other high

quality sea foods. This must include studies on the effectiveness of both fertilization and of feeding for increasing production.

1.05 Efforts should be intensified at the Central Bangkhen Station to develop cheap and efficient fish feeds, both of the complete and supplemental types. The development of economical efficient aquacultures for both fishes and shrimps is dependent upon the availability of such feeds.

A fish feed and nutrition specialist from Auburn should work with the biologists at the Bangkhen Station for approximately one month in March or April, 1972, to assist in formulating feeds and setting up methods of testing.

1.06 Several reservoirs near Khon Kaen have parasites that cause such a severe rash on anyone wading in the water that fishermen avoid these waters. This is probably a type of schistosomiasis carried by snails. Also, schistosomiasis may develop in new reservoirs in the Northeast as a result of impounding the Mekong River. For this reason, it is recommended that the fishery biologists at the Northeast Agricultural Center direct their efforts to biological methods of snail control in these reservoirs by use of herbivorous fishes that eliminate aquatic vegetation which harbor snails, plus use of snail-eating fishes.

A parasitologist from Auburn should assist in planning the research. Two visits per year of one month each are recommended, with the first visit in the spring of 1972.

1.07 For freshwater culture, priority should be given to methods for pond culture of the following species cultured individually and in combination:

Tilapia nilotica
Cyprinus carpio
Aristichthys nobilis
Ctenopharyngodon idella
Hypophthalmichthys molitrix
Clarias batrachus
Anabas testudineus

1.08 While Tilapia nilotica (pla nin) appears to be the most efficient and to yield the highest crop of any species tested, reproduction of pla nin in culture ponds often results in undesirably large numbers of small fish. To eliminate excessive numbers of small fish, experiments should be conducted using the following:

- a.) Tilapia nilotica plus a fish-eating species such as Ophicephalus striatus, Pangasius larnaudii, Oxyeleotris marmoratus, or Lates calcarifer.
- b.) Monosex culture of Tilapia nilotica.
- c.) Cage culture of T. nilotica (which prevents reproduction).

1.09 The freshwater shrimp, Macrobrachium rosenbergii, should be tested as a supplemental species with fish and in a monosex culture where feeding is used to obtain high production.

1.10 Research to develop more efficient methods for fisheries management of village and of small irrigation reservoirs should be expanded to determine the amount and frequency of phosphate fertilization, the most efficient numbers, sizes, and combinations of fishes for stocking, dates of stocking, and the possibility of continuous harvests throughout the year.

1.11 Since larger fingerling fishes (above 15 cm total length) are necessary for best results in stocking reservoirs and ponds, and since pond space

at the stations is insufficient for their production, research should be conducted on the use of rice fields as nursery ponds for this purpose. This research can best be conducted at the fisheries stations that have experimental rice paddies such as Chiang Mai, Udon Thani, Surin, and the Northeast Agricultural Center. In addition to providing fish of the sizes needed for stocking, this can increase the income of the farmers that produce them.

1.12 The extension efforts are handicapped by lack of coordination.

At present, extension personnel are partly under the Inland Fisheries Extension Section at Bangkok. Those in Mobile Units in the Northeast are directly responsible to the stations heads, those in the South are responsible to the Freshwater Mobile Unit in Bangkok or to the Brackishwater Fisheries Development Project, and still others are responsible to the Ditch and Dike Project. These should be consolidated under one head at Bangkok so that better training, planning, and coordination can be made available to the field personnel. For coordination of activities, those located at the various fisheries stations should be under the direction of the station head, who in turn would be responsible to the head of Extension at Bangkok for this phase of the station's work.

1.13 The Extension Section at Bangkok is presently divided into the following units:

- Training and Information
- Demonstration
- Audio-Visual Aids
- Fish Culture Services
- Fish Culture Evaluation

This is without clearly defined differences in duties and responsibilities to each other. A simpler division of duties is suggested as outlined below:

I. Training and Information

audio-visual aids
aquaculture manuals
training extension personnel
public exhibits
news releases

II. Aquaculture Services

direct supervision of field station extension personnel
briefing field personnel on new research results
planning demonstrations of improved aquacultures in ponds,
rice fields, pens, and cages

III. Extension Statistics

plan surveys to determine numbers and areas of ponds,
reservoirs, and swamps
annual new construction of ponds
compilation of fish production data from farmers under
extension supervision
catch from natural waters and from reservoirs, and other
data needed to plan fisheries development and to evaluate
effectiveness of extension activities

1. 14 The effectiveness of extension manuals for farmers should be improved by use of pictures and/or drawings to illustrate various steps in fish production, combined with short, simple paragraphs in language the farmers can understand. The procedures recommended should be revised to include the more recent results of research.

2.0 HIGHLIGHTS OF RESEARCH RESULTS 1971

2.01 Village Reservoir Management

Two village reservoirs were managed in 1969-1970 to improve fishing through use of phosphate fertilization and by stocking more desirable species. These measures were successful in increasing the catch by an estimated 166 and 300 per cent respectively. The villages were highly pleased and management was extended to include 6 additional reservoirs in 1970-71.

2.011 Nam Sang Kam Reservoir

One of two reservoirs (of 25 rai) at Nam Sang Kam near Udon was managed in 1969-1970, and management was extended to both reservoirs totalling 50 rai, in 1970-71. The catch in 1970 was 1,294.5 kg (51.8 kg/rai), which was increased to 5318.5 kg (106.7 kg/rai) in 1971. Fertilization was the same both years, but the rate of stocking fish was increased from 80 per rai in 1969 to 380 per rai in 1970, because the lower rate of stocking produced larger fish than was considered desirable, and because higher rates of stocking, within limits, result in higher fish production. During the first experiment, the catch was increased by an estimated 580 per cent, while the 1971 catch was a further increase of 86 per cent above that in the previous year, or 1,078 per cent higher than the estimated annual catch before management was begun.

2.012 Nong Bua Reservoir

This reservoir (near Chiang Mai) also was managed for higher production in 1969-1970, by stocking and fertilization. The catch was increased above the estimated standing crop of 9 kg/rai before management to 25.6 kg/rai in 1970, or 166 per cent increase.

It was again stocked in 1970, fertilized as before, and opened to fishing in April 1971. However, the catch was only 516 kg, or 9.2 kg per rai, a decrease was primarily due to two differences in the methods of stocking in the two years as follows:

<u>Year</u>	<u>1969-1970</u>	<u>1970-1971</u>
Number fish stocked per rai	450	280
Date of stocking	October 22, 1969	December 20, 1970
Opened to fishing	April 4, 1970	April 21-23
Total days of growth	164	122
Total catch, kg	1,401.	516

It appeared that both the lower rates of stocking and the shorter period for growth that resulted from the late date of stocking in 1970-1971 were primarily responsible for the poorer results. From the rates of growth during the 2 years in both of the above reservoirs, it appears that the stocking should be at least 500 fish per rai. Also, if the fish were stocked in August while the water is still rising, better survival, a longer period of growth, and higher production should result. These assumptions will be checked in future stockings of these and other reservoirs.

2.02. Other Village Reservoirs in Which Research is in Progress

2.021 Bor Paep Village Reservoir

This 72-rai reservoir is being managed by the Nong Khai Station and was stocked with:

<u>Thai Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Number stocked</u>
Pla nai	Common carp	<u>Cyprinus carpio</u>	14,400
Pla nin	Nile tilapia	<u>Tilapia nilotica</u>	<u>17,680</u>
Total			31,680

It has been fertilized monthly with 5 kg/rai of 12-24-12 fertilizer and will be opened for fishing in April, 1972.

2.022 Nong Takran Reservoir

This reservoir at Bung Ban is being managed by the Nakhon Ratchasima Station. It has an area of 217 rai at high water and 150 rai at low water. It was stocked with the following species:

<u>Thai Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Number stocked</u>
Pla nai	Common Carp	<u>Cyprinus carpio</u>	2,000
Pla nin	Nile tilapia	<u>Tilapia nilotica</u>	4,000
Silver carp	Pla lin-hue	<u>Hypophthalmichthys molitrix</u>	250
Grass carp	Pla choa-hue	<u>Ctenopharyngodon idella</u>	250
Bighead carp	Pla soong-hue	<u>Aristichthys nobilis</u>	<u>250</u>
			7,000

This rate of stocking is too low and additional species will later be added to bring the number up to 500 fish/rai.

2.023 Ped Village Reservoir

This 300-rai reservoir is being managed by the Khon Kaen Station.

An old reservoir, it was renovated with the Fisheries Department supplying materials for construction of a concrete spillway. The reservoir was stocked with the following species:

<u>Thai Name</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Number stocked</u>
Pla nin	Nile tilapia	<u>Tilapia nilotica</u>	10,000
Pla nai	Common carp	<u>Cyprinus carpio</u>	3,000
Pla salid	Sepat Siam	<u>Trichogaster pectoralis</u>	3,000
Total			16,000

This reservoir is not being fertilized and is open continuously to fishing, except in a "fish sanctuary" that extends about 100 meters in front of the dam. Under such conditions, there is difficulty in determining the catch and the rate of stocking used is insufficient to make much change in the fish population or the catch.

2.024 Ban Tum Reservoir

There are two reservoirs of 30 and 10 rai which the village leases at a total annual rent of 4,000 baht to private operators to raise fish. The ponds are stocked and both are fertilized with manures and other wastes from the village. The fish stocked were pla nai and pla salid. These sell for 10 baht per kg in the village.

Management of these and of 6 additional reservoirs are planned for 1972-1973. The research aspects will deal with: stocking different species for specific purposes, such as weed or snail control; rates of stocking; time of stocking; sizes of fish used in stocking; and rates of fertilization.

2.03 Efficiency of Various Species of Fish

2.031 Relative Efficiency of pla nin (T. nilotica) and pla nai (C. carpio)

Two experiments dealt with this subject. One dealt with the relative efficiency of the two species with and without fertilization, conducted at Nong Khai and the other with efficiency of pla nin with and without fertilizer and with fertilizer plus feeding.

2.032 Experiments at Nong Khai

These experiments were conducted in 400 m² ponds with stocking rates of 5 and 10 fish per m², with and without fertilization with 3 replications. The fertilized ponds received 5 kg/rai of 12-24-12 for 3 months followed by 10 kg/rai for 2 months. While the experiment was lost due to floods that covered the station to a depth of 2 meters, monthly seining records indicated the following relative efficiencies for the 2 species at the end of 5 months:

Fish	Item	Fertilized		Unfertilized	
		5/m ²	10/m ²	5/m ²	10/m ²
Pla nin	Standing crop, kg/ha	1,725	2,850	1,110	1,940
	Net gain kg/ha	1,650	2,700	1,350	1,800
	Average size, grams	34.5	28.5	22.2	19.4
Pla nai	Standing crop kg/ha	325	350	220	340
	Net gain kg/ha	265	190	155	200
	Average size, grams	6.5	3.5	4.4	3.4

It is evident that pla nin was much more efficient than pla nai when feeding upon natural food organisms produced in either fertilized or unfertilized ponds. In the above calculation it was assumed that there was no mortality of either species during the test. Actual mortality could not be measured because of loss during the flood. However, common carp usually give 95 per cent survival and tilapias average 80 per cent. Even if these corrections were made, the relative results would not be materially affected.

The ranking in efficiency agrees with that obtained in 1970. However, when chicken manure was used as fertilizer, relative production of the two species in a 6-month experiment using 1,000 fish per rai was 1,010 kilograms per hectare for pla nai and 1,405 kilograms per hectare for pla nin. Pla nai (common carp) is known to use chicken manure directly as a feed, and this species gives low production except when fed.

2.033 Production of Pla Nin with Feed and Fertilizer at Tak

Pla nin (T. nilotica) (2- to 3-gram fish) was stocked at 2,400 per rai, (1.5/m²). The experiment lasted 6 months. Ponds were fertilized with superphosphate at 10 kg/rai/month; and feeds added per rai were 228 kg rice bran + 440 kg Lemna (wet weight). Results were as follows:

Treatment	Produced Kg/rai	Average size gram
No fertilizer	80.335	46
Fertilized + feeding	135.993	89
Fertilizer	142.2	87

Here approximately the same production resulted from fertilized ponds and from fertilized and fed ponds apparently because of the short growing period, the low rate of initial stocking, the small size of the fish used in stocking and the poor quality of the feed. The nutritive values of the aquatic weed, Lemna, and of rice bran could not be evaluated within 6 months because of the low weight of fish used in stocking.

2.034 Relative Efficiency of Pla Salid and Pla Nai at Khon Kaen

The ponds were fertilized with chicken manure at the rate of 40 kg/200m² per month. Stocking was at the rate of 1,000 pla nai per rai and of 4,800 pla salid per rai. After the first month, fish were fed the Bangkhen pellet at 3 per cent rate, readjusted monthly. The stockings were pla salid alone, pla nai alone and the two species combined, with 2 replications. The results were as follows:

Treatment	Produced Kg/rai	Produced Kg/ha	Per cent Survival
Pla nai alone	226.4	1,358.4	96
Pla salid alone	99.6	595.6	39.8
Pla nai + Pla salid	(178.6 + 102.4) = 281.0	1,686.0	93.1 and 36.1

Pla salid thus appeared a less efficient species than the common carp. Also, although the two species were the same size (3-5 cm) when stocked, survival of pla salid was poorer than that of pla nai (common carp).

2.035 Production of the Air-Breather, Anabas testudineus, (Pla Mor) at Bangkhen Station

These fish were stocked at the rate of 422 per 50m² pond and fed the Bangkhen pellet at 3 per cent, readjusted monthly. The initial average

weight was 2 grams. Results in six months were as follows:

Total Production - 409 kg/rai = 2,454 kg/ha
S conversion = 3.83
Survival = 93 per cent
Average size = 34.5 g at harvest

This was quite high production, but it should be possible to increase it greatly by use of better quality feed and larger fish for stocking.

2.036 Other Species Being Tested

The following species are currently undergoing tests at various stations, but the results will not be available for several months when the experiments are terminated.

<u>Scientific Name</u>	<u>Thai Name</u>	<u>Station</u>
<u>Puntius gonionotus</u>	Pla tapien	Chiang Mai
<u>Pangasius sutchi</u> plus <u>Cyprinus carpio</u>	Pla sawai and Pla nai	Surin
<u>P. sutchi</u> plus <u>Monosex Tilapia nilotica</u>	Pla sawai and Pla nin	Surin

Tests completed rank fish in the following order of efficiency when fed upon natural food organisms:

<u>Thai Name</u>	<u>Common Name</u>	<u>Scientific Name</u>
Pla nin	Nile tilapia	<u>Tilapia nilotica</u>
Pla nai	Common Carp	<u>Cyprinus carpio</u>
Pla salid	Sepat Siam	<u>Trichogaster</u> <u>pectoralis</u>

The same order of efficiency was maintained when the fish were fed pelleted feeds. While pla nin was most efficient, it does spawn in the ponds and produces too many small fish, while pla nai does not. Because of this, many fish farmers prefer pla nai. Future research will deal with the prevention of overcrowding by small fish where pla nin is being cultured. The young fish can be eliminated by adding a predatory fish such as pla chon, or possibly the goby Oxyeleotris marmoratus; by monosex culture; or by cage culture of pla nin.

The climbing perch also appeared capable of giving high production. It is an air-breathing fish like the walking catfish, pla duk dan; The Chinese carps in combination also gave good results in preliminary tests.

2.04 Combined Rice and Fish Culture

Farmers have been reluctant to accept widely the practice of combined culture of rice and fish in the rice fields. The reasons given were danger of complete loss due to flooding and to drought, the high loss to predators and to poachers, and the added work in constructing ditches and higher bunds around the field. Because of lack of wide acceptance, research on this problem is being drawn to a close. Results from tests conducted to date indicate:

Pla nin is considered by farmers the best fish to use.

Stocking rate is 300 to 500 per rai, optimum 325.

Average yields of fish were:

Without feed-35 kg/rai

With feed-40 kg/rai

Yield of rice with fish (at Northeast Center) = 200 to 244 kg/rai

In 1971 tests when the fields were fertilized with 8-4-4 at 67 kg/rai and the fish were fed 13.1 kg of a cooked mixture (5-5-2) of rice bran, broken

rice and pond weed, Hydrilla, the yield of pla nai was 67 kg/rai.

2.05 Cage Cultures of Fish

This research at most stations has been postponed until a complete feed can be formulated by the Bangkok Station. However, at the Chai Nat Station research was continued on cage culture of the catfish, pla sawai, using a feed mixture of

50 per cent fish meal
30 per cent rice bran
20 per cent broken rice

This should have been nutritionally adequate in protein, but lacked essential vitamins. It produced 85 to 91 kg of fish per m³ of cage in 6 months. Growth rate was slow during the last month, probably because of lack of vitamins. Conversion averaged 4.5, which is too high for a good feed. The feed cost 1.3 baht/kg, making the cost of feed per kg of fish produced 5.85 baht. Conversions below 2.0 will be necessary for commercial use of pelleted feeds for fish production.'

2.06 Pen Cultures

The use of fenced areas within a reservoir for intensive fish culture appears potentially desirable especially in areas where farmers have too little land or cannot afford to construct ponds. Only one test at Maha Sarakham station was set up in 1970, but the fence was made of galvanized chicken wire that rusted out in spots within a 6-month period. As a result, part of the fish were lost, but the remainder were removed and weighed. In a pen of 200 m², 1,000 pla nin (T. nilotica) were stocked, but only 300 were recovered. The weight recovered was 278 kg/rai, equivalent to 1868 kg/ha in a 6-month period. The feed used was an incomplete supplemental feed of rice bran

plus broken rice. The standing crop of fish within the reservoir itself was estimated from rotenone sampling as approximately 10 kg/rai, only approximately 3.6 per cent that in the pens.

In 1971, a total of 14 pens of 200 m² each at Maha Sarakham and at Huey Sithon Reservoir, were fenced with split bamboo, stocked with the common carp (pla nai), and the Indian carp, Labio rohita (rohu). The pens were fertilized with cut aquatic weeds at 20 kg/pen/week and fed with an additional 1 kg chopped weeds/pen/day. The aquatic weeds are Ipomea, Pistia, and Salvelina. Results will be evaluated by monthly sampling plus removal and weighing of all fish after 6 to 8 months. The length of the culture period will depend upon their rate of growth.

2.07 Macrobrachium rosenbergii Shrimp Culture

The Bangkhen Station was successful in raising this shrimp through its larval stages in brackish water to the juvenile form that lives in fresh water. The Marine Station at Songkhla and Mr. Snit Tongsanga of Kasasart University were also successful in accomplishing this on a pilot scale. There remains the additional testing needed to expand this culture to a commercial scale.

These shrimps have traditionally spawned in the estuarine area of the Chao Phrya River system, passed their larval stages in brackish water, then, upon reaching the juvenile stage, migrated far up the rivers and grew to maturity in freshwater rivers, swamps and ditches. Dams on the rivers have denied them access to areas farther upstream. For this reason, an annual program of stocking juveniles above the dams might be desirable and

should be tested. Of more promise is the development of methods for the commercial culture of this shrimp in ponds. Bangkok had one test of raising them in a 1.9-rai pond along with pla nin, pla nai and the Chinese carps. Of the 2,000 shrimps stocked, 54.3 per cent were recovered after 10 months, with an average size of 78 grams. Production was 15 kg shrimp/rai plus approximately 300 kg, i of fish. This indicates that this shrimp may be a valuable secondary crop in combined fish and shrimp culture, providing species are excluded that would feed directly upon the shrimp.

Additional experiments are in progress on methods for commercial production of shrimp alone. These indicate that it is possible to grow the shrimp from an initial size of 6 grams to sizes ranging from 100 to 140 grams in 6 months where they were fed on pelleted fish feed.

3.0 SUMMARY OF PROGRESS IN EXTENSION

3.01 Fishculture in Rice Fields

In 1970, extension help was extended to 1,786 farmers who raised fish in 39,582 rai of rice fields. General acceptance of this method of fish culture does not appear promising because of the losses from flooding and drought, as well as excessive loss to predation and poaching. Also, use of insecticides on the rice crop in certain areas makes rice-fish production impossible.

3.02 Fishculture in Ponds

Advice was given to 8,169 farmers who were raising fish in ponds. The average size of the ponds was approximately 700 m². In the Chiang Mai province there are 3,000 ponds and 385 new ponds were built in 1971. At Tak, the total number of ponds was only 500, but 200 were built in 1971. At Udon, the rate of construction was increasing the number of ponds by

approximately 10 per cent per year. Data was not available from other areas, but will be collected in future years by the extension personnel.

3.03 Cage Culture

Extension advice was given to only 47 farmers on methods of cage culture. Most of this was on the cage culture of catfish and carp in the floating cages on rivers in Central Thailand, because the use of cage culture elsewhere must await development of a cheap complete feed for fish.

3.04 Ditch Culture

The culture of fish in irrigation canals and ditches on farms is principally practiced in Central Thailand, but may be expected to increase in other areas as irrigation water becomes available. A total of 515 farmers raised fish in 168 rai of ditches.

3.05 Fishes for Culture

Results of research show that pla nin (Tilapia nilotica) produces a materially greater crop of fish than pla nai (Cyprinus carpio). Extension personnel report that farmers were initially greatly pleased with pla nin, and considered it an excellent fish for culture. However, overproduction of young fish by pla nin has caused many farmers to abandon its culture and revert to culture of pla nai, despite its lower production. Pla nai does not reproduce during its culture in ponds or rice fields; only large fish are present at harvest. Until research by the fisheries stations can develop methods of culture for pla nin that reduce or eliminate the small fish, use of this species by farmers will probably decrease.

4.0 RESEARCH PROJECTS IN 1971

The research projects for 1971 are given under the headings listed below. Stations where this research is being conducted and specific titles of research projects are given in Section 10.0 of this report.

- 4.01 Culture of Fishes in Cages
- 4.02 Culture of Fishes in Pens
- 4.03 Culture of Fishes in Ponds
- 4.04 Culture of Marine and Brackishwater Fishes
- 4.05 Culture of Fishes in Rice Paddies
- 4.06 Culture of Crabs and Molluscs
- 4.07 Culture of Shrimps in Ponds
- 4.08 Diseases of Fishes
- 4.09 Feeds and Feeding
- 4.10 Life History
- 4.11 River Pollution
- 4.12 Spawning of Fishes
- 4.13 Surveys and Studies of Impoundments and Streams
 - Fisheries Surveys and Studies on Reservoirs and Swamps
 - Fisheries Surveys and Studies on Rivers
 - Fisheries Surveys and Studies on Irrigation Tanks and Village Ponds
- 4.14 Taxonomy
- 4.15 Miscellaneous

5.0 PARASITES AFFECTING FISH AND MAN

5.01 Organisms in Reservoirs that Cause Dermatitis in Man

Without specific studies, it is impossible to determine the cause of the human dermatitis that practically prevents fishing in some impoundments near Khon Kaen. However, there are two groups of animal parasites which are associated with dermatitis conditions in man. The cercariae of certain species of animal schistosomes produce a cercarial dermatitis in man called "swimmers itch." A dermatitis called "Kobure" has been reported from Asia caused by Schistosoma japonicum, the schistosoma most likely to be present in Thailand.

If this species is involved, the problem is much more severe than a simple dermatitis. This species causes bilharzia in man which is probably the number one world health problem.

Two groups of parasitic nematodes reportedly cause skin eruptions in man. The larvae of Strongyloides stercoralis and related species cause a hemorrhagic condition of the skin in the initial penetration. Species of Trichostrongyloid larvae cause a "creeping eruption" type of dermatitis in man.

Obviously, spread of this condition would be undesirable, and it is for this purpose that we have recommended a visit of one month by our parasitologist in April or May, to determine the causal agent, to evaluate the seriousness of the problem, and to set up the necessary research. This is to be followed by another visit of one month approximately six months later to evaluate and redesign the research, and to give on-the-job training to the Thai biologists involved in this research.

6.0 PROBLEMS ARISING IN CULTURE AND MARKETING OF PLA SALID

Pla salid, Trichogaster pectoralis, is cultured in ponds south of Bangkok.

The cultural method consists of flooding former rice fields that contain rank growths of native grasses with water pumped from the nearby klong. After flooding, brood pla salid are then stocked. These reproduce in the pond, and each week part of the vegetation is dragged under water by suitable home-made equipment. The pla salid feed upon decaying organic matter and on periphyton. The piscivorous snakehead, pla chon (Ophicephalus striatus) is pumped into the pond along with the water from the klong, and gradually reduce the overabundance of small pla salid. After about six months, the remaining fish are ready for harvest, with production averaging 400 to 500 kg of fish per rai, about 20 per cent of which is pla chon.

The pla salid are dressed, removing head, entrails, and scales, placed in a brine solution for 12 or more hours, and then salted and placed in the sun to dry. Practically all these fish are sold locally and abroad in neighboring countries as dry salted fish. The export market disappeared when it was found that some of the fish were contaminated with an insecticide that had been used to keep fly maggots out of the fish during the drying process. The industry has subsequently suffered disastrously low prices for its product due to reluctance of buyers and loss of foreign market. Confidence in the purity of the product will have to be slowly regained and other methods developed for blow-fly control while the fish are drying.

Another difficulty that has been experienced was death of the original stock of pla salid. This appears to be due to reduction of dissolved oxygen below 1 ppm by decaying plants when the field is first flooded. If this turns out to be the case,

the problem can be solved by delaying the stocking of pla salid for about 1 week to allow the dissolved oxygen level to rise to a suitable level (3 ppm or above). This is under investigation by the Thai biologists.

It may be necessary to use other species of fishes in the culture, such as the Chinese carps, which sell for a higher price than pla salid, until foreign markets for the dried and salted fish can be regained.

7.0 PROBLEMS ARISING IN CULTURE OF PLA DUK DAN

The culture of Clarias batrachus, pla duk dan, was developed by farmers to the south of Bangkok near the Gulf of Thailand. Location near the Gulf was necessary because feed for culture of this catfish was trash fish captured by shrimp fishermen. Originally, these fish were sorted from the shrimp and thrown overboard. Subsequently, the sale of these trash fish to the catfish farmers added to the income of the shrimpers. The increased demand for these fish by increasing numbers of fish farmers resulted in raising the price from 25 to 50 and then to 75 satang per kilo. With increase in chicken farms, trash fish also came into demand for use in chicken feeds, with the result that the price of the trash fish is expected to rise to between 90 satang and 1 baht per kilo. The conversion of the trash fish-rice bran (9 to 1) feed mixture was of the order of 6 kilo feed per 1 kilo of fish produced; thus the cost at 50 satang per kilo of feed results in a cost of 3 baht (15 cents) per kg of fish produced, while 70 satang for feed results in 4.2 baht (17.5 cents) per kg of fish. The sale price of the catfish varies from 6 to 10 baht (30 to 50 cents) per kg.

Some costs of production were obtained from a grower who operated 105

ponds, each 400 m². In each pond he produced 3 to 4 tons fish each 6 months. The land value was 50,000 baht per rai (\$6,250 per acre). However, he rented the land on a long-term lease for 120 baht/rai/year (\$15/acre/year). Construction of ponds required 100 man-days and the total cost was 2,450 baht per pond (\$1,225 per acre). Cost of fingerlings was 6 baht per 100 fish and 100 were stocked per m². An additional cost at this location was cost of pumping water, but the owner expected to get it from a roadside klong shortly. Since each 400 m² pond required an equal space for dirt disposal, slightly less than 2 ponds could be constructed per rai. The costs of producing 16 kg fish per m² of pond area were:

<u>Item</u>	<u>Baht</u>
Rent on land	0.30
Pond rental, 6%	0.37
Water	0.50
Fish for stocking	6.00
Feed	77.20
Labor	4.00
Equipment	<u>2.00</u>
	90.37

Production costs were then 5.65 baht/kg. The cost of marketing is unknown. Fish were sold at the central fish market in Bangkok at from 6 to 10 baht/kg.

Because of the closer margin of profit, many small catfish farmers went out of business. With large farms, Clarias culture was still profitable. However, rising cost of trash fish will make it mandatory to produce a cheap pelleted feed. Feed can be formulated at about 2 baht/kg and conversion should not be over 1.5. This could reduce cost of feed by approximately 1.8 baht/kg fish produced.

*Production ranged from 7 to 10 kg/m²/6 months.

With development of treatments to reduce loss to parasites and diseases, the rate of stocking can be reduced by 50 per cent, thus further reducing costs.

8.0 HATCHERY PRODUCTION AND FISH DISTRIBUTION

Use of improved techniques for production of fingerling fishes has enabled all stations to meet the local demand for fish needed for stocking, while using a smaller number of ponds than was formerly required. The ponds freed by these procedures are used to develop methods of fish farming and improved methods of hatchery operation.

8.01 Need for Larger Fingerling Fishes

Small fish produced by the stations for sale to fish farmers or for stocking natural waters are usually 2 to 3 cm in length. However, 7- to 15-cm fish must be produced for stocking into natural waters and reservoirs in order to get satisfactory survival.

The need for producing larger fingerlings for management of reservoirs will require more pond space than is presently available at most of the stations. There are a number of procedures that may help solve this problem.

The extension specialists have trained farmers to produce fish fry and fingerlings for sale to other farmers. The local fish farmers can raise the 2-cm fish to 7 cm or more at low cost by stocking them into rice paddies.

The stations can produce larger fingerlings in cages suspended in reservoirs, by pen culture in marginal waters, or they may contract with farmers to raise them to the necessary size in paddy fields. If the more intensive methods are used, parasite and disease problems can be expected to increase. Satisfactory control techniques must be developed before these methods can be used.

8.02 Summary of Production and Distribution of Fishes for Stocking in 1971

Detailed figures on production of each species is given under Section 10.02 for each of the stations. The following table summarizes this information.

Station	Fingerlings	
	Produced	Distributed
North		
Chiang Mai	1,395,950	891,495
Chiang Rai	2,326,823	754,555
Tak	1,136,400	800,000
Northeast		
Khon Kaen	1,825,000	824,970
Maha Sarakham	660,000	500,000
Nakhon Ratchasima	800,000	270,000
Nong Khai	826,000	518,210
Sakon Nakhon	764,000	331,100
Surin	1,143,190	365,411
Ubon Ratchathani	1,214,000	800,000
Udon Thani	938,950	573,200
Central		
Bangkhen	4,019,700	2,000,000
Chai Nat	1,102,000	661,100
Nakhon Sawan	105,000	30,000
South		
Pattani*	18,000	-----
	<u>18,275,013</u>	<u>9,320,041</u>

*Operations interfered with by communist harrassment in this area.

APPENDIX

9.0 THE DEPARTMENT OF FISHERIES

The Department of Fisheries is under the direction of Sant Bundhukul, Director-General, and is one of the departments in the Ministry of Agriculture, located in Bangkok. The previous Director-General, Prida Karnasut, has been promoted to the position of Secretary of State in the Ministry of Agriculture.

The Inland Fisheries Division, under its Director, Chertchai Amatyakul, is one of four divisions in the Department of Fisheries. In the Inland Fisheries Division are the Aquacultures, Extension, Mobile Units, Design and Construction, and the Experimental Stations and Units. Extension specialists and engineers for design and construction of stations, ponds, and reservoirs are located at the Experimental Stations. These and the research units will be described in the following pages.

The personnel of the Inland Fisheries Division Headquarters are as follows:

Chertchai Amatyakul, Division Director	M. S. Auburn University
Chai Vacharasatian, Assistant Director	B. S. Kasetsart University
Prapas Nitayachin, 2nd Grade Biologist	B. S. Kasetsart University
Rikit Nukulrug	B. S. Kasetsart University

9.01 The Five-Year Agriculture and Fisheries Development Plan

The Agricultural Development Strategy for Thailand¹ includes plans for more rapid development of both inland and marine fisheries, with considerable emphasis on aquaculture in coastal and inland waters.

Statistics on catch from inland and marine areas from 1961 - 1969 are given in Section 12.0 of this report. The inland fisheries statistics are very incomplete because of the large amount of fishery products consumed by "subsistence" or the occasional fishermen.

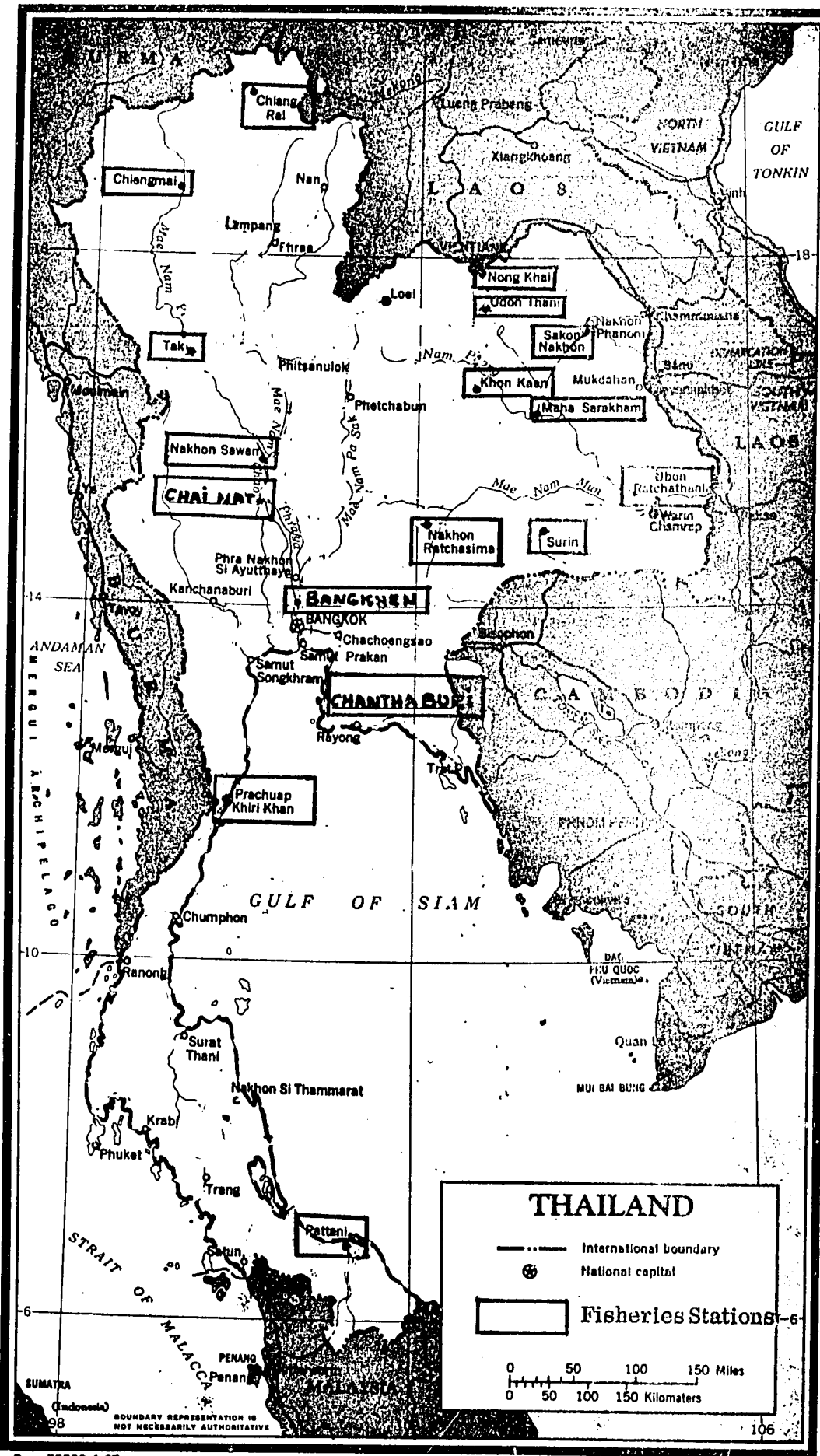
1. Agricultural Development Strategy for Thailand. A Report by the Agricultural Development Strategy Sub-Committee. Published by the Office of the National Economic Development Board. December, 1969.

9.02 The Inland Fisheries Hatchery and Research Facilities

Locations of the inland fisheries stations of the Department of Fisheries are shown on the following map. Chiang Mai, Chiang Rai, and Tak are located in North Thailand; Khon Kaen, Maha Sarakham, Nakhon Ratchasima, Nong Khai, Sakon Nakhon, Surin, Ubon Ratana Reservoir, Ubon Ratchathani, and Udon Thani are located in Northeast Thailand; Bangkhen, Chai Nat, and Nakhon Sawan (Bung Bora Pet) are located in Central Thailand; and Phattalung, Pattani, Chanthaburi, and Prachuap Khiri Khan are located in South Thailand. The two latter are brackishwater stations. The stations will be discussed in Section 10.0

Most of the fisheries research in Thailand is conducted at the various fisheries stations of the Department of Fisheries. Fisheries research is also conducted at Kasetsart University, which is located approximately 20 miles north of Bangkok and immediately adjacent to the Bangkhen Fisheries Station.

In addition, fisheries research is conducted at the Northeast Agricultural Center near Khon Kaen, the Ditch and Dike Project at Bangkok and Chai Nat, and the Fishery Taxonomy Unit, Fishery Biology Survey Unit, and Brackish Water Mobile Unit at Bangkok.



Base 55533 1-67

Map of Thailand showing location of the fisheries research stations

10.0 TITLES OF CURRENT FISHERIES RESEARCH PROJECTS AND THOSE RECENTLY COMPLETED

10.01 Culture of Fishes in Cages

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Bangkhen	The experiment on culture of <u>C. batrachus</u> in cages.		x	
Chai Nat	<u>Pangasius sutchi</u> culture in nylon net floating cages.	x	x	
Chiang Rai	Cage culture of <u>C. carpio</u> , <u>T. nilotica</u> , and <u>T. melanopleura</u> .		x	
Fisheries Management	Fishery development in five irrigation tanks, N. E. region.			x
Khon Kaen	<u>P. sutchi</u> , cage culture in running water.		x	
Maha Sarakham	Growth rate of <u>C. carpio</u> in cages.	x		
Nakhon Sawan	Cage culture of <u>P. sutchi</u> .		x	x
Nong Khai	<u>C. carpio</u> in nylon cages.	x		
Sakon Nakhon	<u>C. carpio</u> culture in floating cages.	x	x	x
Sakon Nakhon	Cage culture of <u>T. nilotica</u> (Linn.)			x
Surin	<u>C. carpio</u> growth rates.	x		
Ubon Ratchathani	Cage culture of Nile tilapia, <u>T. nilotica</u> (Linn.)			x
"	Cage culture of common carp, <u>C. carpio</u> (Linn.)			x

10.02 Culture of Fishes in Pens

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Chiang Rai	Pen culture of the grass carp, <u>C. idella</u> .			x
Maha Sarakham	Experiment on <u>T. nilotica</u> and <u>T. melanopleura</u> culturing pens in irrigation tanks.			x
Surin	Production of <u>T. nilotica</u> Linn. and <u>C. carpio</u> Linn. culture in pens in Kaset irrigation tanks.			x

10.03 Culture of Fishes in Ponds

Bangkhen	Effect of pH on fingerling pond fishes.	x		
"	<u>T. nilotica</u> fry production with various ratios of σ to φ brood.	x		
"	<u>C. batrachus</u> , with trash fish or Auburn No. 2 pellets, with various rates of stocking.	x		
"	<u>C. macrocephalus</u> culture.		x	
Chai Nat	Production of <u>T. nilotica</u> in ponds with different rates of stocking.		x	
"	<u>C. carpio</u> culture in ponds with different rates of stocking.		x	
Chiang Mai	Production of <u>Puntius gonionotus</u> .	x		x
Chiang Rai	A comparison on yields with and without manure in culture of Chinese carps.		x	
"	Production of <u>C. carpio</u> and <u>T. nilotica</u> with the application of manure.		x	

10.03 Culture of Fishes in Ponds--continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Chiang Rai	Culture of <u>Notopterus chitala</u> .		x	
Ditch & Dike	<u>T. nilotica</u> in combination with <u>C. carpio</u> .		x	
Khon Kaen	Combination fish culture of <u>C. carpio</u> and <u>Trichogaster pectoralis</u> .			x
"	Productivity of fish ponds at Khon Kaen Fisheries Station by using biological index.			x
Maha Sarakham	Effect of inorganic fertilizer on production of Nile tilapia, <u>T. nilotica</u> Linn. in ponds.			x
Nong Khai	Stocking rates and production of <u>C. carpio</u> Linn. and <u>T. nilotica</u> Linn. from fry to fingerling in fertilized and unfertilized ponds.			x
"	Production of harvestable size <u>C. carpio</u> Linn. and <u>T. nilotica</u> Linn. with and without feeding in fertilized ponds.			x
Pattani	Pond culture of <u>C. carpio</u> and <u>T. nilotica</u> .			x
Sakon Nakhon	Production of common carp, <u>C. carpio</u> Linn. and Nile tilapia, <u>T. nilotica</u> Linn. in ponds.			x
Surin	Production of pond-cultured carp, <u>C. carpio</u> .		x	
"	Pond culture of <u>P. sutchi</u> in combination with <u>C. carpio</u> and monosex culture of <u>T. nilotica</u> .			x
Tak	Pond culture of <u>Trichogaster pectoralis</u> with inorganic fertilizers and supplementary feed.	x		x

10.03 Culture of Fishes in Ponds--continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Tak	Production of <u>T. nilotica</u> in fertilized and unfertilized ponds with periodic harvests.	x	x	
Ubon Ratchathani	Growth rate of <u>Fangasius sanitwongsei</u> .		x	
"	<u>Probarbus jullieni</u> culture.		x	

10.04 Culture of Marine and Brackishwater Fishes

Chanthaburi	Pond culture of sea bass, <u>Lates calcarifer</u> .		x	
"	Combination pond culture of <u>L. calcarifer</u> and <u>T. mossambica</u> at Chanthaburi.			x
"	Preliminary studies of life history of <u>Mugil dussumieri</u> Cuv. and Val.			x
Prachuap Khiri Khan	Milkfish culture in ponds and abundance of fry in coastal waters.	x		
"	<u>L. calcarifer</u> and <u>T. mossambica</u> in brackishwater ponds.		x	x
"	Species and abundance of fry of brackishwater fish in Kloung Wan Bay.		x	
"	Life history of mullets			

10.05 Culture of Fishes in Rice Paddies

Chiang Mai	Fish culture in paddy fields	x	x	
------------	------------------------------	---	---	--

10.05 Culture of Fishes in Rice Paddies

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Ditch & Dike	<u>C. carpio</u> culture in rice fields using animal manure and inorganic fertilizers.		x	
"	<u>C. carpio</u> culture in fields with different spacing of rice.	x		
"	Paddy field culture of <u>Puntius gonionotus</u> Bleeker after harvesting season.			x
Khon Kaen	<u>C. carpio</u> , <u>T. nilotica</u> , and <u>Trichogaster pectoralis</u> culture in paddy fields.	x		
Northeast Agricultural Center	<u>T. pectoralis</u> culture in rice fields.		x	
"	<u>C. carpio</u> culture in rice fields.	x		
"	Experiments on rice field fish culture.	x		x
Sakon Nakhon	<u>C. carpio</u> production.	x		
Surin	Common carp culture in rice fields.			x
Udon Thani	Evaluation of success of rice field culture of <u>C. carpio</u> in Udon Thani and Nong Khai Provinces.	x		
"	<u>C. carpio</u> culture in rice paddy fields.	x	x	
"	Experiments on comparison of the production of <u>T. nilotica</u> in paddy fields.			x

10.06 Culture of Crabs and Molluscs

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Chanthaburi	Raft method of culture for the oyster, <u>Pycnodonta numisma</u> .	x		
"	Cage culture of blue crab, <u>Scylla serrata</u> .	x	x	x
"	Comparison of three methods of oyster culture.		x	
Invertebrate Coastal Culture	Oyster culture at Chanthaburi Province.			x
Prachuap Khiri Khan	Culture of Japanese oyster, <u>Crassostrea gigas</u> .		x	
"	Culture of native osyters.	x	x	
"	Comparison of oysters at Klong Wan Bay and Paknam Pram Buri			x

10.07 Culture of Shrimps in Ponds

Bangkhen	Culture of giant freshwater prawn, <u>Macrobrachium rosenbergii</u> .	x		
Chai Nat	Growth rate of the giant freshwater prawn, <u>M. rosenbergii</u> , when fed with different feeding rates	x		x
"	<u>M. rosenbergii</u> culture in combination with <u>P. gonionotus</u> .		x	
Chanthaburi	Experiment on rearing shrimp.			x

10.08 Diseases of Fishes---continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Bangkhen	Parasites and diseases of pond fishes.	x		
"	Effect of antibiotics in the culture of <u>C. batrachus</u> Linn.			x
"	Parasites of <u>Clarias</u> sp. in ponds.		x	
"	Diseases and parasites of the snakehead, <u>Ophicephalus striatus</u> Bloch, culture in ponds.			x

10.09 Feeds and Feeding

Bangkhen	Feeding <u>C. carpio</u> with different formulae of pelleted feeds.	x	x	x
"	Pond conversion value "S" of various supplementary diets.		x	
"	Supplementary diets for feeding <u>C. carpio</u> fry.		x	
"	Corn meal diets of feeding common carp.			x
"	Climbing perch, <u>Anabas testudineus</u> (Bloch) with ground trash fish and pelleted feed.			x
"	Using different forms of feeds for feeding common carp.			x
Chai Nat	Termites as food for <u>C. carpio</u> with emphasis on conversion factor.	x		
Surin	Comparison of growth rate among three sizes of <u>C. carpio</u> fed on different formulae feeds.	x		

10.09 Feeds and Feeding--continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Surin	Rearing <u>C. carpio</u> from fry to fingerlings, feeding with <u>Moina</u> sp. and artificial feeds.		x	
Ubon Ratchathani	Termites as food for <u>C. carpio</u> .	x		

10.10 Life History

Bangkhen	Mirror carp from Germany			x
"	Primary study on biology of <u>A. testudineus</u> .	x	x	
"	Embryological and morphological development of <u>C. carpio</u> and <u>C. batrachus</u> .		x	
"	Embryological and morphological development of kissing gourami, <u>Helostoma temminckii</u> .			x
"	Embryological and morphological development of snakehead, <u>C. striatus</u> Bloch.			x
"	Biology of sand goby, <u>Oxyeleotris marmoratus</u> (Bleeker).			x
Chanthaburi	Life history of mullets			x
Chiang Mai	Biology of <u>Puntius gonionotus</u> : propagation and embryonic development.	x	x	
Chai Nat	Food habits of <u>Catlocarpio siamensis</u> .	x	x	
"	Life history of <u>Cyclocheilichthys enoplos</u> .			x

10.10 Life History--continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Chai Nat	Life history of <u>Wallago dinema</u> Bleeker.			x
Inland Fishery	Biology of <u>Catlocarpio siamensis</u> at Chai Nat and Nakhon Sawan Fisheries Stations.			x
Khon Kaen	Food habit of <u>Morulius chrysophekadion</u> in the Ubon Ratana Reservoir.	x	x	
Maha Sarakham	Life history of <u>Hampala dispar</u> .	x	x	x
Nakhon Sawan	Life history of <u>Datnioides microlepis</u> .		x	x
"	Stomach and intestine contents of some species of fishes in Bung Bora Pet.	x	x	
Northeast Agricultural Center	Stomach contents and state of gonad development in fishes of Northeast Thailand.		x	
"	Food habit and spawning season of nilem, <u>Osteochilus hasselti</u> , in Bung Kang Lava, Khon Kaen.			x
"	Food habit and spawning season of featherback, <u>N. notopterus</u> Pallas in Bung Kang Lava, Khon Kaen.			x
"	Life history of serpenthead, <u>O. striatus</u> Bloch, in Huey Tuey Irrigation Tank, Khon Kaen.			x
"	Life history of <u>Mystus numerus</u> (Cul. and Val.) in Bung Kang Lava, Khon Kaen.			x

10.10 Life History--continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Phattalung	Life history of <u>Prophagorus</u> <u>nieuhofti</u> .		x	
Tak	Life history of <u>Puntius daruphani</u> . x	x		x
"	Preliminary life history of <u>O. marulius</u> .			x
Ubun Ratana Reservoir	Life history of <u>Cyclocheilichthys</u> <u>apogon</u> .		x	
"	Life history of <u>Puntioplites</u> <u>proctozyron</u> (Bleeker).			x
"	Life history of <u>N. notopterus</u> (Pallas).			x

10.11 River Pollution

Ditch & Dike	Toxicity of herbicides to <u>C.</u> <u>carpio</u> .		x	
Northeast Agricultural Center	Toxicity of kenaf retting water to fishes.		x	
"	Monitoring of Chi River for data on kenaf pollution.			x
Ubun Ratchathani	Effect of pollution from keraf retting to fish in irrigation tanks.		x	

10.12 Spawning of Fishes

Bangkhen	Selective breeding of <u>C.</u> <u>carpio</u> .	x	x	
"	Ovarian development of silver carp.	x	x	
"	Induced spawning of <u>Cirrhinus microlepis</u> .		x	
"	Fry production of different sizes of <u>T. nilotica</u> .			x

10.12 Spawning of Fishes --continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Bangkhen	Production of <u>C. batrachus</u> fry		x	
"	Induced spawning of Chinese carps	x		
Chiang Mai	Experiment on induced spawning of <u>P. sutchi</u> Fowler by pituitary injection.			x
Chai Nat	Fry production of <u>T. nilotica</u> Linn.			x
Chiang Rai	Artificial breeding of Chinese carps.	x		
"	Featherback fish (<u>Notopterus chitala</u>) breeding	x		
Khon Kaen	Spawning of <u>Osteochilus hasselti</u> .	x	x	
"	Fry production of common carp from different ages and sizes.			x
Maha Sarakham	Fecundity of various sizes of <u>T. nilotica</u> .	x		
Nakhon Sawan	Artificial breeding of <u>P. sutchi</u> by pituitary injection.	x		

10.13 Surveys and Studies of Impoundments and Streams

Fisheries Surveys and Studies on Reservoirs and Swamps

Biological Survey Unit	Ubon Ratana	x		
	Kaeng Kra Jan	x	x	x
	Lam Dom Noi			x
	Lam Pao	x	x	

10.13 Surveys and Studies of Impoundments and Streams--continued

<u>Station of Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
<u>Fisheries Surveys and Studies on Reservoirs and Swamps</u>				
Biological Survey Unit	Lam Ta Kong	x		x
	Bung Si Fi	x	x	
	Lam Pra Perng	x		x
	Nong Bua		x	
	Rong Hua Chang			x
	Nong Sang Kam			x
Chai Nat	Fisheries biology around Chaophya Dam.		x	
Nakhon Sawan	Fishery survey of Bung Bora Pet.		x	
"	Fishery survey in flood area of Nakhon Sawan.		x	
"	Species composition and standing crop of fish fauna surveys in Bung Bora Pet.			x
"	Survey on general environmental conditions of Bung Bora Pet.			x
Sakon Nakhon	Fishery survey of Nong Harn Lake.			x
Tak	Limnology of the Bhumipol Reservoir.		x	x
"	Fishing methods and fishing areas of Bhumipol Reservoir.	x	x	x
Ubon Ratana Reservoir	A study on fish population in Ubon Ratana Reservoir.		x	x
"	Comparison of efficiencies of stationary fishing gears in Ubon Ratana Reservoir.		x	x

10.13 Surveys and Studies of Impoundments and Streams--continued

<u>Station of Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
<u>Fisheries Surveys and Studies on Reservoirs and Swamps</u>				
Ubon Ratana Reservoir	A selection of the most efficient tagging methods for some species in the Ubon Ratana Reservoir.			x
"	Fish stocking in Ubon Ratana Reservoir.			x
<u>Fisheries Surveys and Studies on Rivers</u>				
Biological Survey Unit	Mekong	x	x	x
	Kwae		x	x
	Nan	x		
	Oon	x		
Nong Khai	Fish collection in Mekong River, Nong Khai Province.	x		
Ubon Ratchathani	General Survey on fishes and fishing gear of Moon River, Ubon Ratchathani Province.	x		x
<u>Fisheries Surveys and Studies on Irrigation Tanks and Village Ponds</u>				
Chiang Mai	Study on production of fish in Nong Bua Reservoir		x	
Chiang Rai	Hydrobiological and fisheries surveys in Kwan Payao.		x	
Maha Sarakham	Evaluation of stocking program in Kaeng Lerng Charn Irrigation Tank.		x	
"	Biological survey in Egasatayasuntorn Irrigation Tank.		x	
"	Preliminary surveys of irrigation tanks.			x
Nakhon Ratchasima	Production of fish stocking in Bung Gan Nong Takrong.			x

10.13 Surveys and Studies of Impoundments and Streams--continued

<u>Station of Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
<u>Fisheries Surveys and Studies on Irrigation Tanks and Village Ponds</u>				
Nong Khai	Production of fish stocking in Bor Paep Village Pond.			x
Northeast Agricultural Center	Fisheries surveys in Huey Syc, Huey Yang, Huey Tuey, Kok Muang, Ta Pra, Non Taevraj, Nong Pa Ko, Sok Ruak.	x		
"	An increase of fish production in Klaow Talad Kokmuang Irrigation Tank.			x
Surin	Stocking of <u>C. carpio</u> (Linn.) and <u>T. nilotica</u> (Linn.) in small impoundment, Sarae Boran, Surin Province.			x
Tak	Fisheries surveys of Nong Luang Irrigation Tank.	x		

10.14 Taxonomy

Invertebrate Coastal Culture	Kinds of blue crabs found in east coast of Thailand.			x
Taxonomy Unit	Taxonomy of freshwater fishes of Thailand.	x	x	x
	Taxonomy of fish Genus <u>Pangasius</u> .	x		
	Characteristics of the Genus <u>Clarias</u> .	x		

10.14 Taxonomy--continued

<u>Station of Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Taxonomy Unit	Morphological description of Genus <u>Labiobarbus</u> .		x	
"	Taxonomy of waterfall fishes in eastern Thailand.			x
"	An investigation of the species of ornamental fishes.			x
Pattani	Collection of freshwater animals in Pattani Province and the adjacent areas.			x
Phattalung	Fish collection on Songkhla Lake.			x
Ubon Ratchathani	Taxonomy of fish in Lam Nam Moon	x		

10.15 Miscellaneous

Bangkhen	Transportation of live fish in polyethylene bags with oxygen.	x	x	
Estuarine Fisheries Extension-Mobile Unit	Economic survey of brackish-water fish farming in Samutprakarn, Samutsongkhram, Samutsakhon, Chacheongsao, and Chon Buri Provinces.			x
Fisheries Management Unit	Fishery management in large reservoir.			x
Invertebrate Coastal Culture	Abundance of young blue crab in the Chanthaburi Station area.			x
Khon Kaen	Culture of <u>Daphnia</u> <u>carinata</u> in ponds.			x

10.15 Miscellaneous --continued

<u>Station or Unit</u>	<u>Project Title</u>	<u>Year Active</u>		
		<u>1969</u>	<u>1970</u>	<u>1971</u>
Northeast Agricultural Center	Releasing fish in irrigation tanks.			x
"	Efficiency of digestion of serpenthead, <u>O. striatus</u> Bloch.			x
Prachuap Khiri Khan	Efficiency of various gears for collecting milkfish fry.	x		
Surin	Physio-chemical characteristics of flood waters in Surin Province.	x		
"	Materials suitable for fish egg receivers.		x	
Ubon Ratchathani	Evaluation of fish culture progress under the supervision of Ubon Ratchathani Station.		x	x

**11.0 SYNOPSIS OF PHYSICAL AND BIOLOGICAL DATA FOR THE FISHERIES
UNITS AND THE FISHERIES RESEARCH STATIONS**

11.01 The Units Located at Bangkok

11.011 Fishery Biology Survey Unit

Ariya Sidthimunka, Chief	B. S. Auburn University
Chiamchit Boonsom, Biologist	B. S. Kasetsart University
Boonchuey Waew-Ngarm, Biologist	B. S. Kasetsart University
Sompong Hiranvat, Biologist	B. S. Kasetsart University
Miss Santana Sangkhakul, Biologist	B. S. Kasetsart University
Vijai Srisuwanatach, Biologist	B. S. Kasetsart University
Komron Potipituk, Biologist	B. S. Kasetsart University
Samrey Sibke, Biologist	B. S. Kasetsart University
Sidthi Boonyarntpalin, Biologist	B. S. Kasetsart University

This unit conducts fisheries surveys on rivers and reservoirs throughout Thailand. It has accumulated information on the composition of riverine and reservoir fish populations and estimates of standing crops by rotenone sampling and seining techniques. Preimpoundment surveys on rivers and creeks have been made before dam construction, and subsequent surveys recorded the changes occurring after impoundment.

Measurements of length-weight relationships of various species are being compiled into a handbook for use throughout Southeast Asia.

Laboratory facilities for this unit are at the Bangkok Fisheries Station.

The unit also cooperates with the stations in conducting experimental management of reservoirs.

11.012 Inland Fisheries Stations Section

Vanich Varikul, Chief of Research	M. S. Auburn University
Preecha Teinchareon, Biologist	B. S. Kasetsart University
Miss Sopa Areeratana, Biologist	B. S. Kasetsart University
Miss Vanida Koonsongnern, Biologist	B. S. Kasetsart University

This unit is responsible for planning research and the details of station management.

Transportation Facilities Available

1. Jeep, willy; purchased in 1959; poor.
2. Jeep, land-rover; purchased in 1965.

Equipment Available

1. 1 binocular microscope
2. 1 compound microscope with camera
3. 1 electric pH meter
4. 1 shadow graph (profile projector)
5. 1 slide projector

11.013 Taxonomy Unit

Vanich Varikul, Chief	M. S. Auburn University
Miss Mali Srirungroj, Biologist	B. S. Kasetsart University
Sombhong Sawunnatod, Biologist	B. S. Kasetsart University
Mrs. Vanpen Sibke, Biologist	B. S. Kasetsart University

This unit serves all other units and stations in identification of fish, prawns, other aquatic animals, and aquatic plants.

Descriptions and pictures of the fishes of Thailand have been prepared for publication. In addition, an extensive series of drawings of algae found in waters of Thailand have been prepared. Publication of this information will be very useful.

The laboratory facilities for this unit are also at the Bangkhen Station.

It is presently working on the taxonomy of the genera Pangasius, Clarias, Labiobarbus, Cyclocheilichthys, Botia, and Trichopsis.

11.014 Inland Fisheries Mobile Unit

Wiset Chomdej, Chief	B. S. Kasetsart University
Sompote Jiebna, Biologist	B. S. Kasetsart University
Narong Sukomol, Biologist	B. S. Kasetsart University
Itsaro Wearakawoot, Biologist	B. S. Kasetsart University

Extension: 7

This unit, located at Bangkok, has responsibility for extension activities in the central section of Thailand.

Transportation Facilities Available

1. 2 Jeeps; Nissan; purchased in 1967; fair.
2. 2 Jeeps; land-rover; purchased in 1968; good.
3. Jeep, land-rover; purchased in 1971; good.

Research Projects

1. Determination of the progress of fish culture due to the Expansion Program in Chacheongsao, Chonburi, and Prajeenburi Provinces.
2. Experiments and comparisons on efficiencies of stationary fishing gears in Ubolratana Reservoir.

11.015 Extension Section

Chirdchan Amatyakul, Chief	M. S. Oklahoma State University
Jitt Petcharoen, Biologist	B. S. Kasetsart University
Paitoon Sukulpone, Biologist	B. S. Kasetsart University
Oranuch Chotikul, Biologist	B. S. Kasetsart University
Pornsiri Kaewnet, Biologist	B. S. Kasetsart University

Extension: 4

Laborers: 13 permanent

This section has responsibility for planning extension activities for the entire country, development of manuals on aquacultures for farmers, and the training and supervision of extension personnel located at the various fisheries stations.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1966; O.K.
2. Jeep, land-rover; purchased in 1965; O.K.
3. Truck, Dodge-fargo; purchased in 1966; O.K.
4. Truck, Dodge-fargo; purchased in 1965; poor.

Equipment Available

1. 2 5-m seines
2. 25 aquaria
3. 4 3-HP water pumps
4. 2 4-HP water pumps
5. 1 5-HP water pump
6. 1 7-HP water pump
7. 1 generator
8. 2 tape recorders
9. 2 amplifiers
10. 1 35-m camera with electronic flashlight unit
11. 1 16-mm movie camera
12. 1 slide projector
13. 1 16-movie projector
14. 1 air pump

11.016 Estuarine Fisheries Mobile Unit

Thawiwat Ingkasuwan, Biologist
Somkuan Ratanatepee, Extension

B. S. Kasetsart University
5 years vocational school

Laborers: 2 permanent

This unit has responsibility for research and extension on coastal fisheries along the Gulf of Thailand and conducts research at Chanthaburi and at Prachuap Khiri Khan.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1969.
2. Jeep, land-rover; purchased in 1970.

Equipment Available

1. 2 50-m seines
2. 2 5-HP water pumps, diesel
3. 2 oxygen tanks
4. 1 2,000-watt generator

11.017 Engineering Section

Chumrus Sriratana, Head
Precha Prachagwong, Engineer
Satit Sigka, Engineer
Suvit Tiravanichanan, Engineer
Vichit Mekanee, Engineer

This unit is responsible for planning and supervising construction for the Department. It assists in locating and planning village reservoirs.

11.018 Research and Extension Unit for Coastal Culture of Oysters and Crabs

Somsukdi Singholka, Biologist	B. S. Kasetsart University 1964
Miss Marayat Dejakaisaya, Biologist	B. S. Kasetsart University 1968
Miss Wilaiwan Chareonkunanont, Biol.	B. S. Kasetsart University 1970

The responsibilities of this unit appear to overlap somewhat with the Estuarine Fisheries Mobile Unit.

Equipment Available

1. 1 dissecting microscope
2. 1 stereoscopic zoom microscope
3. 1 salinometer
4. 2 pocket pH meters
5. 1 water analyzer
6. 5 thermometers
7. 1 Ekman dredge
8. 2 plankton nets
9. 1 sechi dish
10. 1 plankton counting cell

11.02 Fisheries Stations in North Thailand

11.021 Chiang Mai Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: San Sai Province: Chiang Mai	1953	51 rai - land 15 rai - water	None on station

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Boonhai Thongsamui	B. S. Kasetsart Univ.	1959
Biologists: Mr. Samrong Powhawm	B. S. Kasetsart Univ.	1964
Mr. Rewat Rithaporn	B. S. Kasetsart Univ.	1969
Extension: 5		
Laborers: 16 Permanent		
4 Temporary		
1 Clerk		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
1	3,900	1	24
1	3,300	2	20
1	2,400	1	12
1	1,672	30	10
2	1,215	3	3
4	800	2	1.5
3	405	39	388
1	400		
4	375		
4	180		
<u>16</u>	<u>200</u>		
38	23,937		

Water supply is from irrigation canals.

Rice Paddy Fields

15 400 m²

Reservoirs in Province

Nong Bua 90,000 m² Min. 30,000

Fish Production

<u>Species</u>	<u>1971</u>	
	<u>produced</u>	<u>distributed</u>
Pla Tapien	489,950	164,050
Pla Khang Lai	14,015	9,650
Pla Nin	79,390	50,070
Pla Nai	<u>812,545</u>	<u>312,125</u>
	1,395,900	535,895

Research Projects

1. Biology of Puntius gonionotus, method of propagation and its embryonic development.
2. A study on fish population survey in Nong Bua Reservoir.
3. Fish culture in paddy fields.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1964; fair.
2. 13 HP longtail motor boat.

Equipment Available

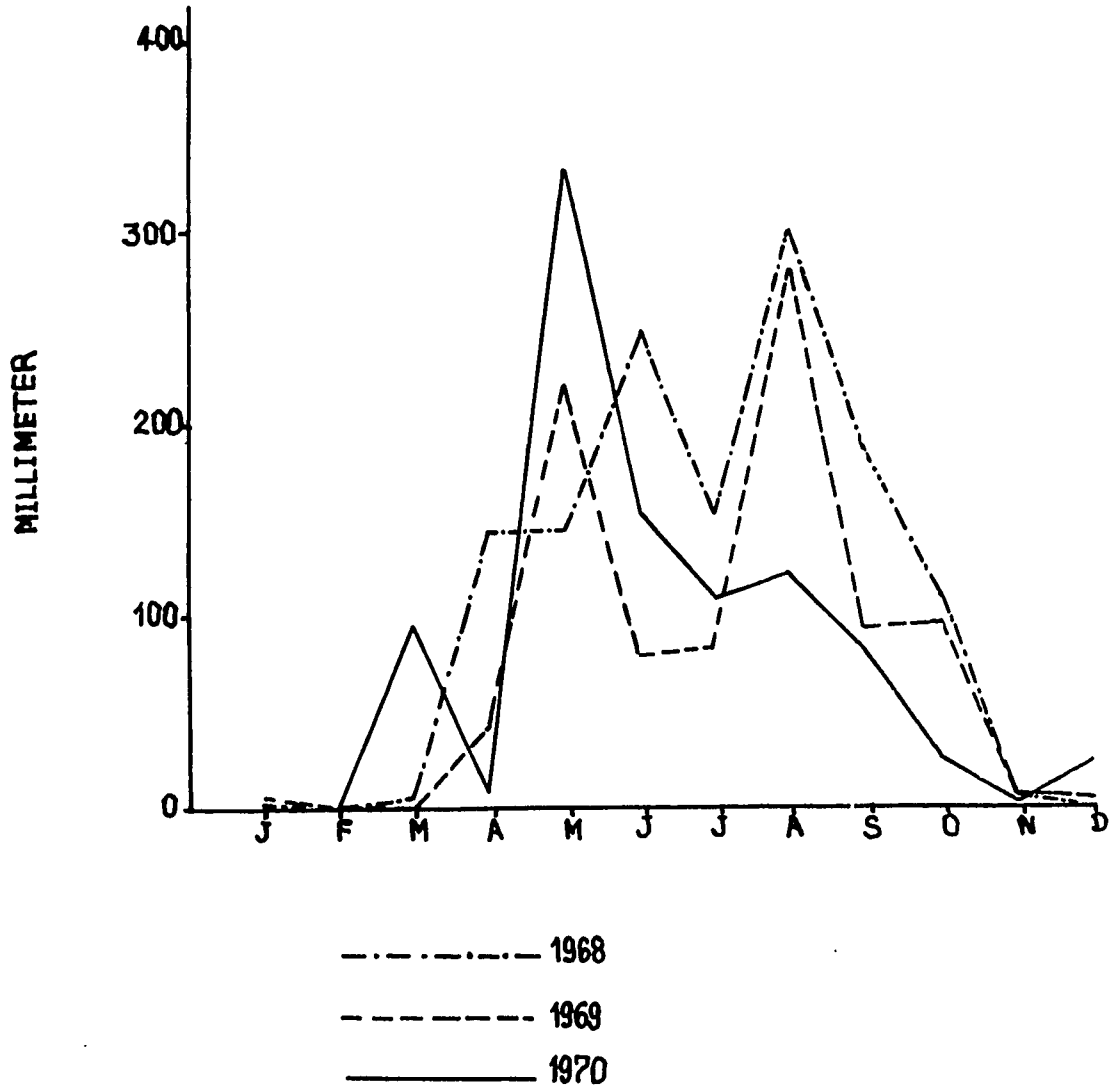
- | | |
|---------------------------|-------------------------------|
| 1. 1 100 m seine | 8. 2 Ekman dredges |
| 2. 2 50 m seines | 9. 1 Kemmerer water sampler |
| 3. 2 plankton nets | 10. 1 refrigerator |
| 4. 2 compound microscopes | 11. 1 analytical balance |
| 5. 2 dissecting apparatus | 12. 1 500 gm capacity balance |
| 6. 10 aquaria | 13. 1 10 gm capacity balance |
| 7. 1 airpump with filter | 14. 1 portable pH meter |

*Stocked in reservoirs.

MONTHLY RAINFALL

1968 - 1970

CHIANG MAI



11. 022 Chiang Rai Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Phayeo Province: Chiang Rai	1941	64.5 rai - land 20 rai - water	None on station Privately owned land can be purchased

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Sawasdi Boonthai	Kasetsart Univ.	1949
Biologist: Mr. Pamu Tavaratmaneegul	B. S. Kasetsart Univ.	1968
Extension: 6		
Laborers: 33 Permanent 7 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
1	240	25	24
6	360 (4 with flowing water)	2	12
1	460	27	624
1	730		
3	1,200		
2	<u>1,440</u>		
14	10,070		

Ponds are drained and filled by gravity.

Fish Production

<u>Species</u>	1971	
	<u>produced</u>	<u>distributed</u>
Pla Nai	504,600	355,160
Pla Nin	304,600	253,315
Pla Khang Lai	158,073	37,725
Pla Lin-Hue	831,100	46,510
Pla Song-Hue	414,450	26,200
Pla Chao-Hue	<u>114,000</u>	<u>35,645</u>
	2,326,823	754,555

Reservoirs

Kwan Phayao 10,600 rai (source of water for the station)

Research Project

Pen culture of the grass carp in Kwan Phayao Lake.

Transportation Facilities Available

1. Jeep, wagoneer; 1971; excellent.
2. Jeep, land-rover; purchased in 1964; good.
3. Truck, Dodge-fargo; purchased in 1966; O.K.
4. Boat, outboard motor; 25 HP; Poor.

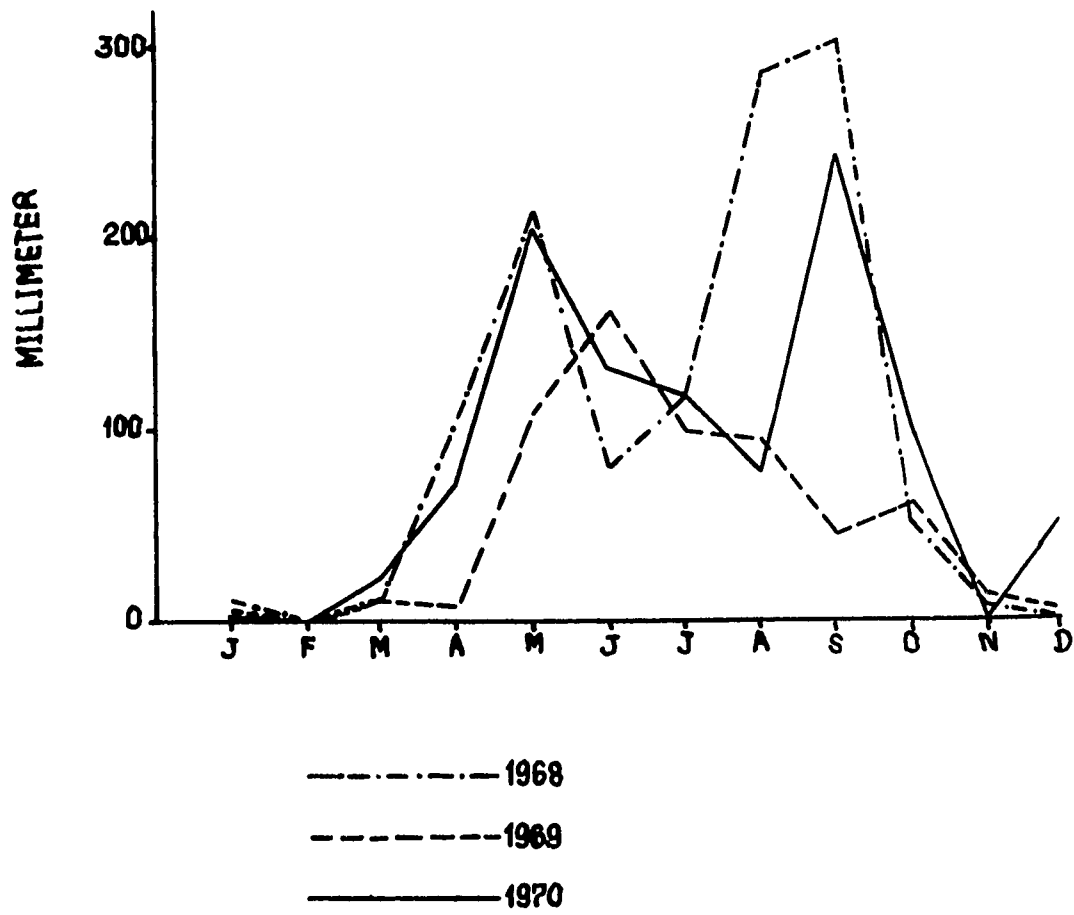
Equipment Available

- | | | | |
|----|--------------------------|-----|-------------------------------|
| 1. | 2 100 m seines | 10. | 1 analytical balance |
| 2. | 1 25 m seine | 11. | 1 100 gm capacity balance |
| 3. | 1 plankton net | 12. | 1 refrigerator |
| 4. | 1 Kemmerer water sampler | 13. | 1 binocular microscope |
| 5. | 1 dissecting apparatus | 14. | 1 pH meter |
| 6. | 1 profile projector | 15. | 2 3 KW generators |
| 7. | 15 aquaria | 16. | 2 3-inch gasoline water pumps |
| 8. | 1 air pump with filter | 17. | 1 centrifuge, electric |
| 9. | 1 Ekman dredge | 18. | 1 scale press |

MONTHLY RAINFALL

1968 - 1970

CHIANG RAI



11.023 Tak Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Tak	1963* 1967**	150 rai - land 12 rai - water	8.1 rai

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Suchit Bhinyoying	B. S. Kasetsart U	1959
Biologists: Mr. Chareon Panin	B. S. Kasetsart U	1962 (At Auburn - 1971)
Mr. Surajit Parianyarut	B. S. Kasetsart U	1966
Mr. Prayot Paosas	B. S. Kasetsart U	1968
Mr. Maitri Duagsawasdi	B. S. Kasetsart U	1968 (M. S. Michigan State - 1971)
Extension: 10		
Laborers: 18 Permanent 14 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
4	1 rai		
7	0.5 rai	20	10 m ²
15	0.25 rai	<u>10</u>	<u>5 m²</u>
5	0.125 rai	30	250
<u>31</u>	<u>11.88</u>		

Nong Luang Reservoir - source of water (500 rai)

Reservoirs

Bhumipol 182,000 rai

Fish Production

<u>Species</u>	<u>1971 Number</u>
Pla Nin	380,000
Pla Nai	380,000
Pla Salid	326,400
Pla duk dan	<u>50,000</u>
	1,136,400

*Temporary location at Bhumipol Reservoir.

**Permanent location at Nong Luang.

Research Projects

1. Life history study of Puntius daruphani including artificial breeding by pit hormone injection.
2. Life history study of Ophicephalus marulius.
3. General study on limnology of Bhumipol Reservoir.
4. Fishing method study in Bhumipol Reservoir.
5. Experimental pond culture of Trichogaster pectoralis applying fertilizer and supplementary food.

Transportation Facilities Available

1. Jeep, willy; purchased in 1963; fair.
2. Jeep, land-rover; purchased in 1966; O. K.
3. Jeep, nissan; purchased in 1967; O. K.
4. Truck, isuzu; purchased in 1964; O. K.
5. 1 125 HP inboard motor boat.
6. 2 50 HP outboard motor boats.

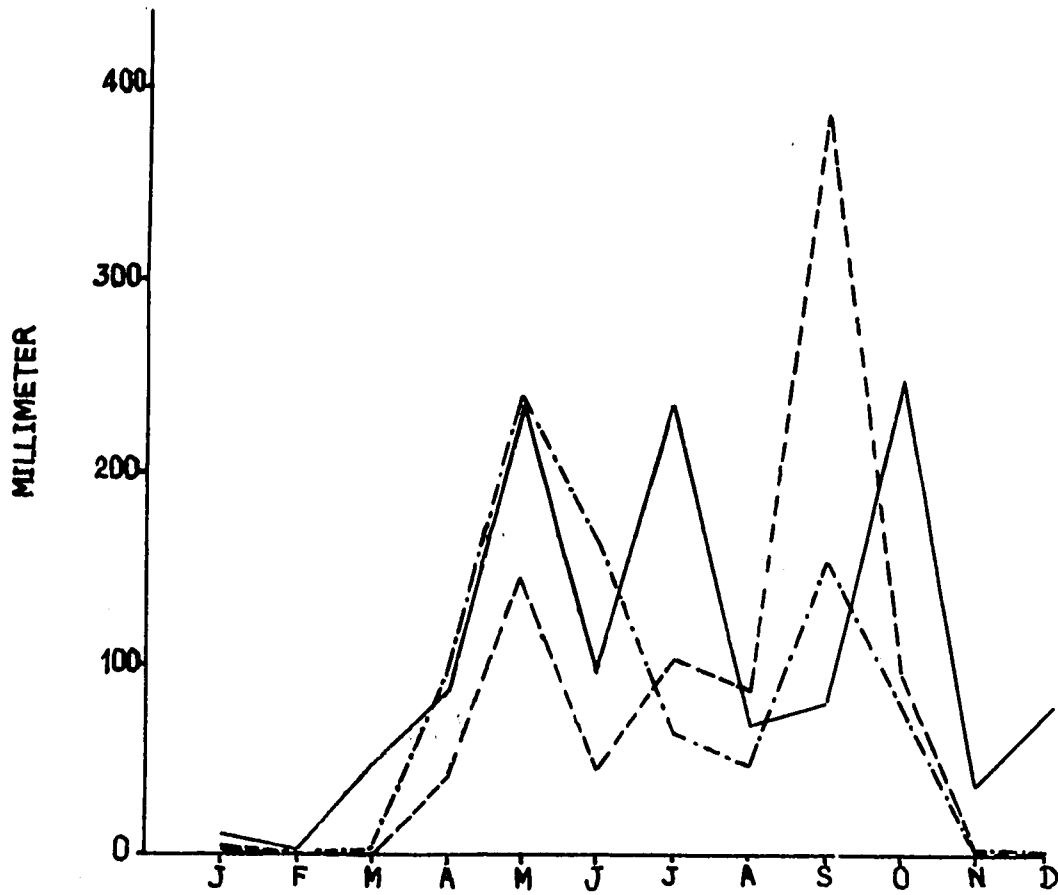
Equipment Available

- | | | | |
|----|--------------------------|-----|-----------------------------|
| 1. | 2 100 m seines | 10. | 2 refrigerators |
| 2. | 6 25 m seines | 11. | 1 analytical balance |
| 3. | 3 plankton nets | 12. | 5 500 gm capacity balances |
| 4. | 35 aquaria | 13. | 1 2,000 gm capacity balance |
| 5. | 1 compound microscope | 14. | 2 secchi disks |
| 6. | 2 air pumps with filters | 15. | 1 electric pH meter |
| 7. | 1 Ekman dredge | 16. | 2 sieves |
| 8. | 1 electric centrifuge | 17. | 1 12 HP pump |
| 9. | 1 Kemmerer water sampler | 18. | 1 5 HP pump |

MONTHLY RAINFALL

1968 - 1970

TAK



---1968
- - -1969
———1970

11.03 Fisheries Stations in Northeast Thailand

11.031 Huey Sithon Fisheries Research and Demonstration Unit

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Kalasin	1967		

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Nixom Kongthon	3 years Vocational School	1958
Biologist: Miss Rewadee Sriprasert	B. S. Kasetsart Univ.	1969 (At Florida)
Extension: 2		
Laborers: 9 Permanent 5 Temporary		

Number and Size (m²) of Ponds

Earthen

9	200
<u>3</u>	<u>300</u>
12	2,700

Reservoirs

Huey Sithon 1,000 rai

Fish Production

<u>Species</u>	<u>1971 Number</u>
Pla Nai	72,550
Pla Nin	<u>87,480</u>
	160,030

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1967; O. K.

Equipment Available

1. 2 25 m seines
2. 2 50 m seines
3. 2 3-inch, 4-5 HP water pump

11.032 Khon Kaen Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Khon Kaen	1953	81.75 rai - land 30.4 rai - water	None on station; soils contain salt deposits. Some ponds have salinity of 10 ppt in dry weather.

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Pratom Taweesak	B. S. Kasetsart Univ.	1961
Biologists: Mr. Somprasong Mobhundit	B. S. Kasetsart Univ.	1966
Mrs. Paob Jaiyen	B. S. Kasetsart Univ.	1968
Extension: 5		
Laborers: 21 Permanent		

Number and Size of Ponds

Earthen

17	800 m ²	4	1 rai
14	200 m ²	5	2.5 rai
11	240 m ²	9	16.50
14	200 m ²		
56	21,840		

Cement

14	15 m ²
27	1.5 m ²
41	250.50

Water supply pumped from Tung Srang Reservoir. Ponds drained by pumping.

Reservoirs

Tung Srang 2,000 rai

Fish Production

<u>Species</u>	<u>1971</u> <u>Number</u>
Pla Nai	810,000
Pla Salid	305,000
Pla Nin	710,000
	1,825,000

Current Research

1. Experiments on the culture of common carp, Cyprinus carpio Linn., in combination with sepat Siam, Trichogaster pectoralis.
2. Productivity of fish ponds at Khon Kaen Fisheries Station by using biological index.
3. Fry production of common carp from different ages and sizes.

Extension Activities

A. <u>Activity</u>	<u>Farmers</u>	<u>Units</u>	<u>Area</u>	<u>Stocked</u>		
				<u>C. carpio</u>	<u>T. nilotica</u>	<u>T. pectoralis</u>
Fishculture in ponds	691	739	827,028 m ²	227,025	99,680	27,450
Fishculture in rice fields	166	---	1,338 rai	116,750	33,730	12,750
Demonstrating fishculture in rice fields	42	---	177.5 rai	<u>61,300</u>	<u>-----</u>	<u>-----</u>
				405,075	133,410	40,200

B. Water Resources Improvement

1. Fish stocking: 766,500 young fish in 57 natural and impounded waters.
2. Constructed 3 fish-dams: 1) at Amphoe Muang; 2) at Amphoe Sichompoo; and, 3) at Amphoe Numpong.

C. Fisheries Development

1. Promoted fish culture in ponds 21 times, 391 farmers, 416 ponds.
2. Promoted fish culture in rice fields, 93 farmers, 902 rai.
3. Checked the results of fish culture in ponds and rice fields 253 times, 568 farmers.
4. Advised and trained the farmers 238 times, 7,140 persons.
5. Carried young fish to demonstration farm 7 times, 41 farms, 57,200 young fish.

Transportation Facilities Available

1. Jeep, wagoneer; purchased in 1970; good.
2. Jeep, wagoneer; purchased in 1965; O.K.
3. Truck, dodge fargo; purchased in 1967; poor.
4. Jeep, international crew-cab; purchased in 1971.

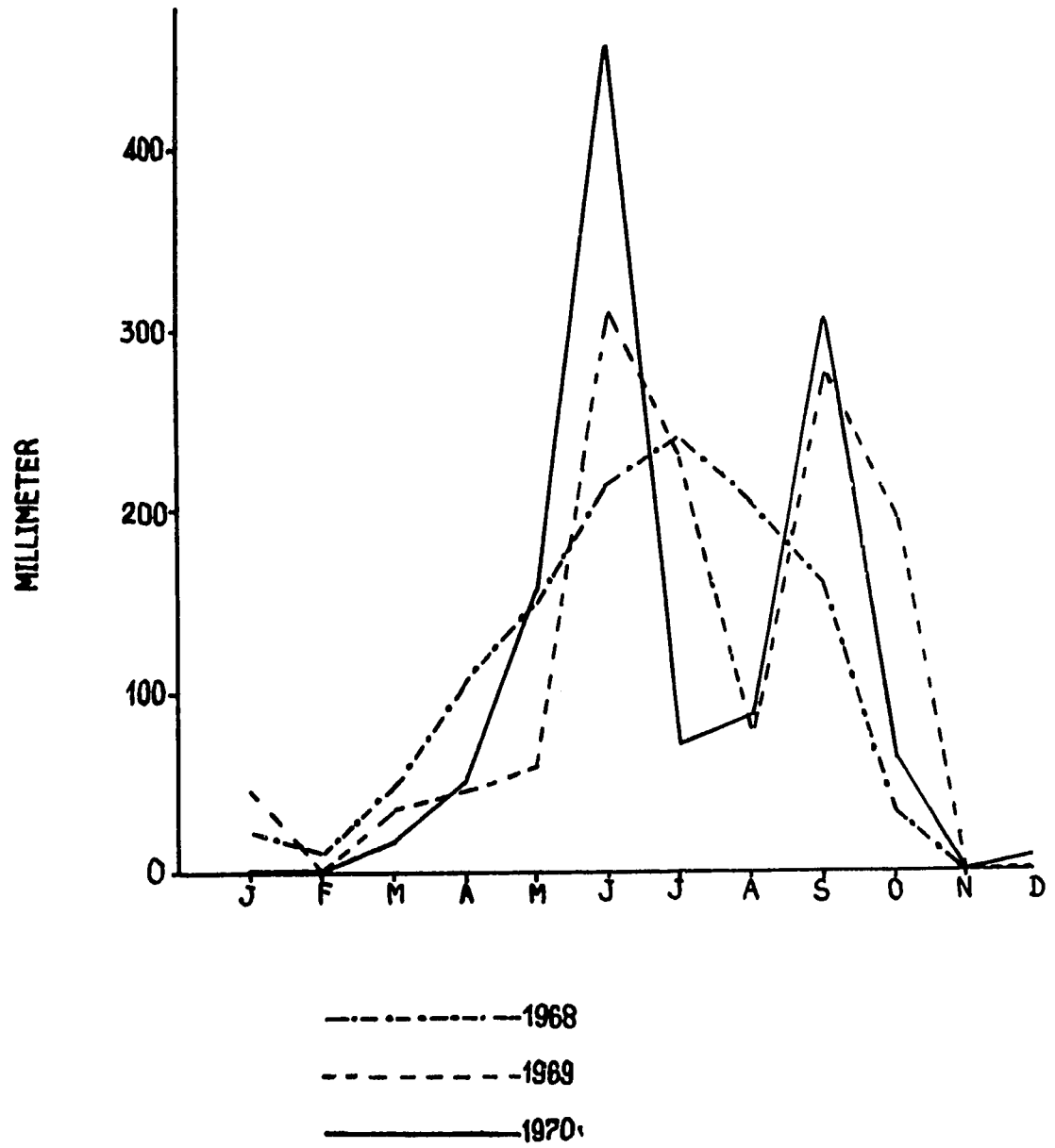
Equipment Available

- | | | | |
|-----|---------------------------|-----|-----------------------------|
| 1. | 1 100 m seine | 13. | 1 dissecting microscope |
| 2. | 2 50 m seines | 14. | 20 aquaria |
| 3. | 4 plankton nets | 15. | 1 centrifuge |
| 4. | 1 Kemmerer water sampler | 16. | 1 refrigerator |
| 5. | 1 Ekman dredge | 17. | 1 barometer |
| 6. | 1 binocular microscope | 18. | 1 max - min thermometer |
| 7. | 1 electric thermometer | 19. | 1 analytical balance |
| 8. | 1 electric pH meter | 20. | 2 water analysis lab kits |
| 9. | 2 water analysis lab kits | 21. | 1 7-kg capacity scale |
| 10. | movie screen | 22. | 1 generator, 3,500 watt |
| 11. | 1 scale imprint press | 23. | 1 5 HP diesel water pump |
| 12. | projector | 24. | 1 10 HP gasoline water pump |
| | | 25. | 1 13 HP diesel water pump |

Equipment Needed

1. 1 15 HP diesel water pump

- 68 -
MONTHLY RAINFALL
1968 - 1970
KHON KAEN



11.033 Maha Sarakham Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Maha Sarakham	1953	20 rai - land 4 rai - water	10 rai - belongs to Irrigation Department

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Wai Pinyo	3 years at Kasetsart Univ.	1947
Biologists: Mr. Manas Chantasut	B. S. Kasetsart Univ.	1966
Mr. Mehta Poompraw	B. S. Kasetsart Univ.	1961
Mr. Kiri Koyunantakul	B. S. Kasetsart Univ.	1968
Extension: 3		
Laborers: 14 Permanent 6 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
2	200	4	10
9	200	5	15
1	400	4	18
3	500	13	187
4	600	<u>Pens</u>	
1	800	7	200
1	900		
21	8,200		

Ponds are drained and filled by pumping.

Reservoirs

Kaeng Lerng Charn 2,000 rai (source of water for the station)

Fish Production

<u>Species</u>	<u>1971 Number</u>
Pla Nai	300,000
Pla Nin	305,000
Pla Salid	<u>55,000</u>
	660,000

Research Projects

1. Evaluation on stocking fishes in irrigation tanks.
2. Pen culture in a reservoir.

Transportation Facilities Available

1. Jeep, wagoneer; purchased in 1970; good.
2. Jeep, land-rover; purchased in 1965; O.K.
3. Truck, dodge fargo; purchased in 1966; O.K.

Equipment Available

- | | | | |
|-----|-----------------------------------|-----|----------------------------|
| 1. | 1 100 m seine | 11. | 1 Kemmerer water sampler |
| 2. | 2 50 m seines | 12. | 1 centrifuge |
| 3. | 2 25 m seines | 13. | 1 refrigerator |
| 4. | 3 plankton nets | 14. | 1 analytical balance |
| 5. | 1 dissecting binocular microscope | 15. | 2 500 gm capacity balances |
| 6. | 2 dissecting apparatus | 16. | 2 thermometers |
| 7. | 10 aquaria | 17. | 1 water analysis lab kit |
| 8. | 1 Ekman dredge | 18. | 1 30 kg capacity balance |
| 9. | 1 air pump with filter | 19. | 1 compound microscope |
| 10. | 1 slide projector (old) | | |

Equipment Needed

1. 1 electric glass electrode pH meter, laboratory model
2. 1 slide projector

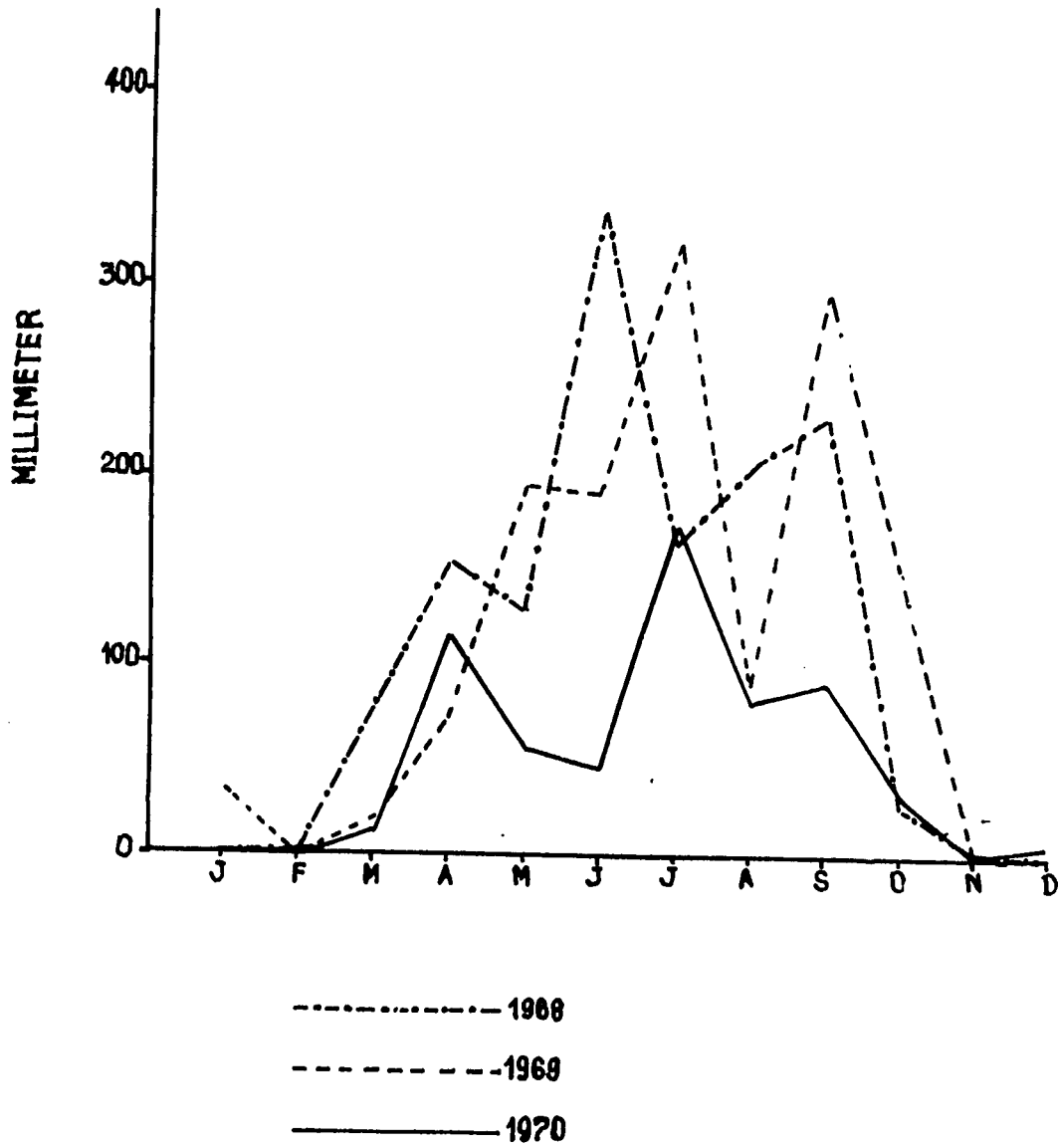
Equipment Available for Extension and Demonstration Activities

1. 1 12 HP water pump
2. 1 5 HP water pump
3. 1 35 mm camera
4. 1 13 HP longtail boat (4 years old)

MONTHLY RAINFALL

1968 - 1970

MAHA SAKHAM



11. 034 Nakhon Ratchasima Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Nakhon Ratchasima	1953	24.5 rai - land 2 rai - water	None on station

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Chanintorn Sritongsuk	B. S. Kasetsart Univ.	1964
Biologists: Mr. Pramot Suwanasart	B. S. Kasetsart Univ.	1964 (At Auburn)
Mr. Veerasak Chueyphat	B. S. Kasetsart Univ.	1969
Extension: 3		
Laborers: 10 Permanent 3 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
4	400	10	10
<u>9</u>	<u>200</u>	<u>4</u>	<u>80</u>
13	3,400	14	420

Water source from moat (17 rai) surrounding the station. Ponds are filled and drained by pumping.

Fish Production

<u>Species</u>	<u>1971 Number</u>
Pla Nai	500,000
Pla Nin	<u>300,000</u>
	800,000

Transportation Facilities Available

1. Jeep, wagoneer; purchased in 1970.
2. Jeep, land-rover; purchased in 1964; O.K.
3. Truck, dodge fargo; purchased in 1967; O.K.
4. Truck, international crew-cab; purchased in 1970.

Mobile Units

Equipment Available

- | | | |
|-----|---------------------------------|-----------------------|
| 1. | 2 50 m seines | 11. 1 water pump |
| 2. | 1 dissecting microscope | 12. 1 movie projector |
| 3. | 1 compound binocular microscope | 13. 1 slide projector |
| 4. | 12 aquaria | 14. 1 generator, 5 KW |
| 5. | 1 Ekman dredge | |
| 6. | 1 dissecting apparatus | |
| 7. | 1 thermometer | |
| 8. | 1 analytical balance | |
| 9. | 1 500 gm capacity balance | |
| 10. | 1 50 kg-100 kg scale | |

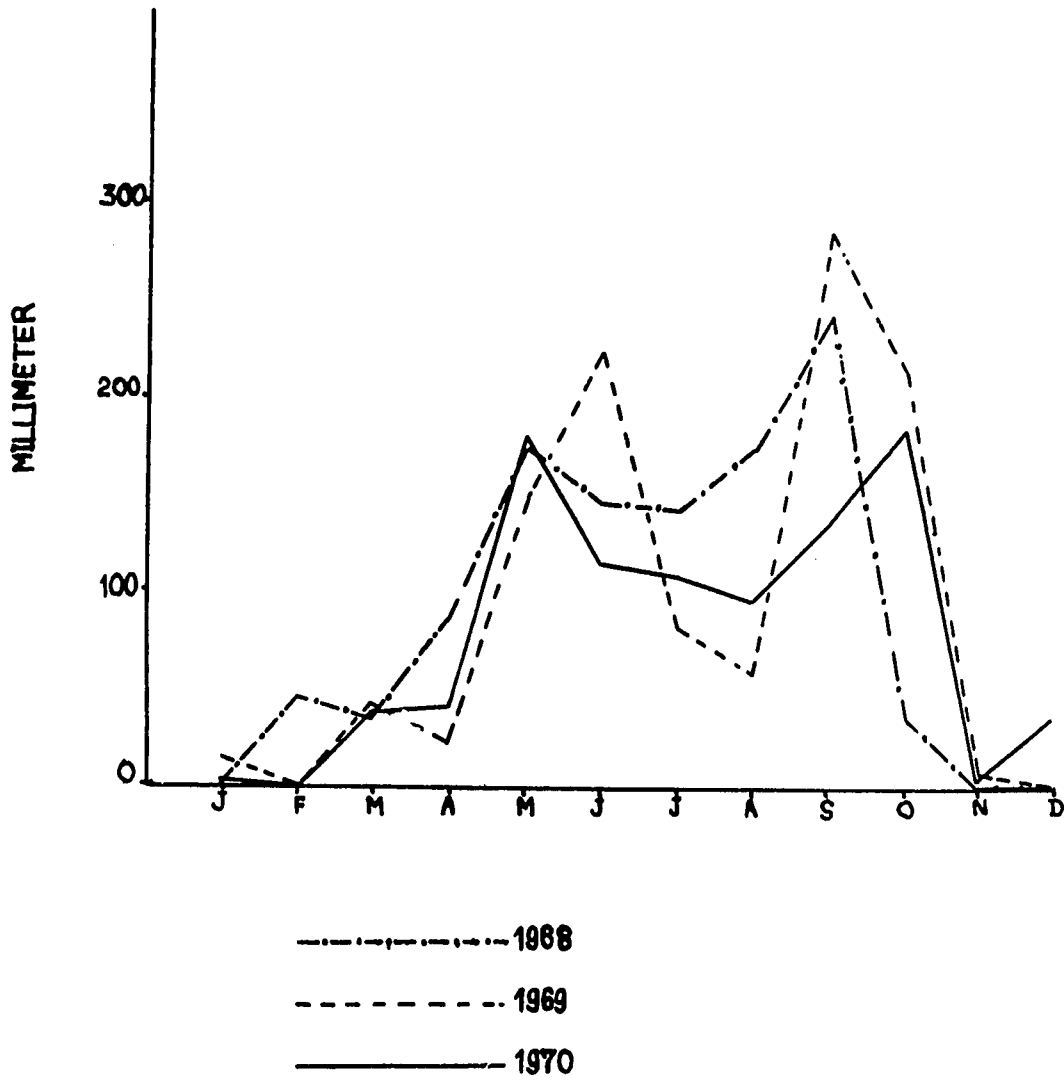
Equipment Needed

1. 1 electronic pH meter, laboratory model
2. 1 Kemmerer water sampler
3. 1 Hach water analysis kit
4. 1 electric thermometer

MONTHLY RAINFALL

1968 - 1970

NAKHON RATCHASIMA



11.035 Nong Khai Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Si Chiang Mai Province: Nong Khai	1968	130 rai - land 7 rai - water	None on station

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Nid Koochareonpaisal	B. S. Kasetsart Univ.	1963
Biologists: Mr. Teinthong Yuovechwatana	B. S. Kasetsart Univ.	1968
Mr. Vichian Plengchawee	B. S. Kasetsart Univ.	1969
Extension: 8 Civil		
Engineers: 2		
Laborers: 8 Permanent 22 Temporary		

Number and Size of Ponds

<u>Earthen</u>			<u>Cement</u>	
8	1 rai	$\frac{10}{10}$ $\frac{200}{2,000}$ m ²	$\frac{20}{20}$	$\frac{10}{200}$ m ²
14	0.5 rai			
22	15.00			

Reservoirs

Nong Kirk 706 rai (water supply for station. Ponds are filled and drained by pumping).

<u>Fish Production</u>	1971	
	<u>Number</u>	
<u>Species</u>	<u>Produced</u>	<u>Distributed</u>
Pla Nai	480,000	366,050
Pla Nin	346,000	152,160
	826,000	518,210

Transportation Facilities Available

1. Jeep, wagoneer; purchased in 1971.
2. Jeep, wagoneer; purchased in 1970; good.
3. Truck, dodge fargo; purchased in 1969; O. K.
4. Jeep, land-rover; purchased in 1968; O. K.
5. Truck, international 1300 pick-up; purchased in 1971.

Mobile Units

Equipment Available

1. 2 100 m seines
2. 2 50 m seines
3. 2 plankton nets
4. 12 aquaria
5. 1 Kemmerer water sampler
6. 1 Ekman dredge
7. 1 compound microscope
8. 1 dissecting microscope
9. 1 500 gm capacity balance
10. 2 30 gm capacity balances
11. 1 current meter
12. 1 underwater thermometer recorder
13. 1 electric pH meter
14. 2 movie projectors
15. 2 slide projectors
16. 1 4-5 HP diesel water pump
17. 1 grinding and mixing machine
18. 1 sprayer for weed control

Current Research

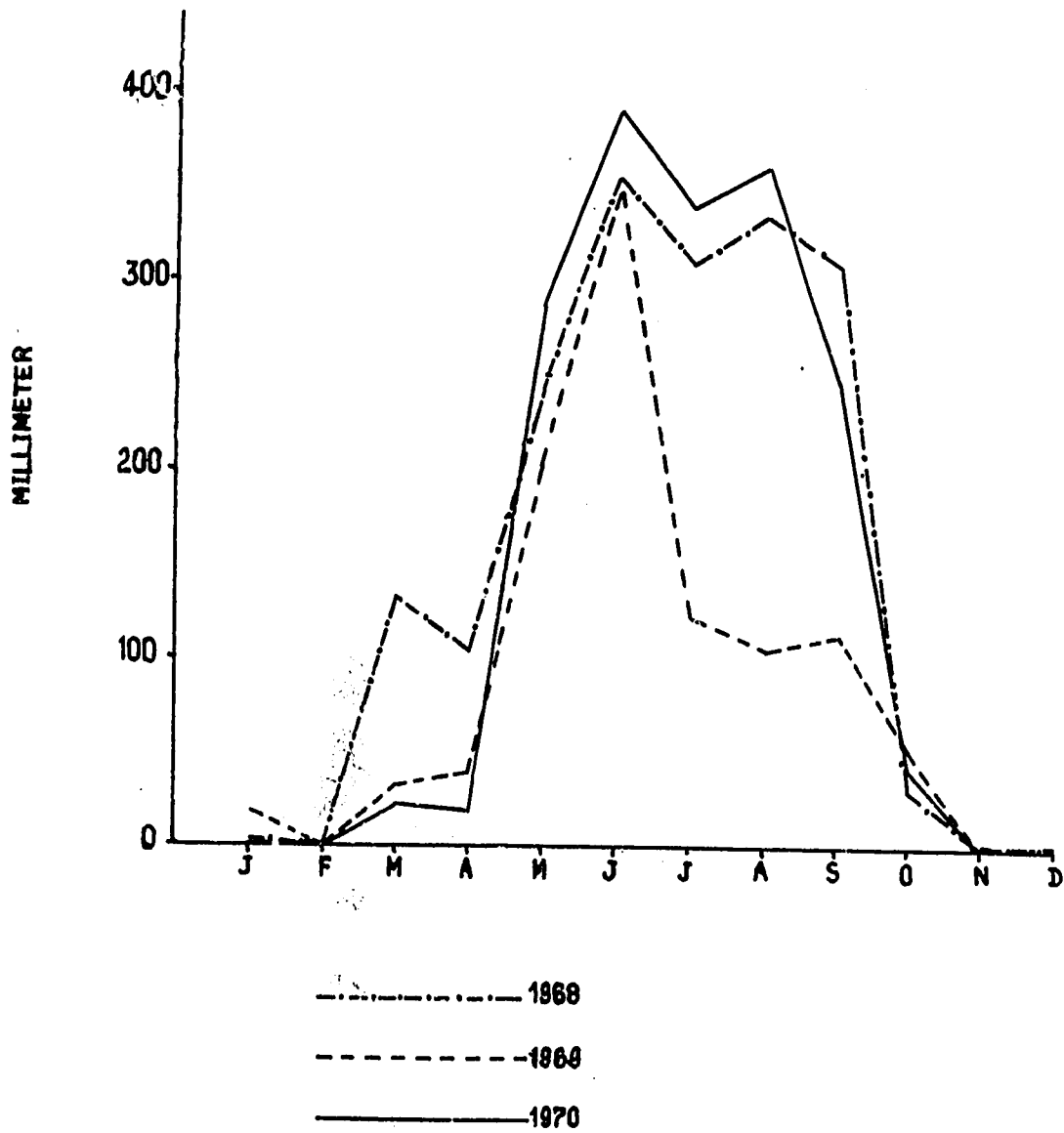
1. Attempts are being made to spawn the following species because it is feared that impounding the Mekong River may eliminate their spawning grounds:

Pangasionodon gigas
Pangasius sanitwongsei
Probarbus jullieni
Leptobarbus hoeveni

MONTHLY RAINFALL

1968-1970

NONG KHAI



11.036 Northeast Agricultural Center Fisheries Unit

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang			
Province: Khon Kaen			
<u>Personnel</u>		<u>Training</u>	<u>Year</u>
Head: Mr. Pipop Kamolrat		B. S. Kasetart Univ.	1964
		M. S. Michigan State	1970
Biologists: Mr. Kitja Jaiyen		B. S. Kasetsart Univ.	1964
		M. S. Michigan State	1969
	Mr. Pinit Sripitakial	B. S. Kasetsart Univ.	1967
	Mr. Nipon Suripan	B. S. Kasetsart Univ.	1968
	Mr. Sutja Sukwibul	B. S. Kasetsart Univ.	1968

11.037 Sakon Nakhon Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Sakon Nakhon	1942	128.75 rai - land 18.75 rai - water	None on station, but large area below dam is controlled by the Fisheries Dept.

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Damrong Silapachai	M. A. Missouri Univ.	1968
Biologists: Mr. Somdej Srikomut	B. S. Kasetsart Univ.	1964
Mr. Phichit Srimookda	B. S. Kasetsart Univ.	1966
Mr. Krisna Thitikulrat	B. S. Kasetsart Univ.	1969
Extension: 15		
Laborers: 40 Permanent		

Number and Size (m²) of Ponds

<u>Earthen</u>				<u>Cement</u>	
1	338	1	209	5	50
3	268	1	570	6	16.5
2	260	1	273	1	28.8
1	700	1	5,550	1	6.7
1	529	1	672	12	6
1	208	1	540	6	8
1	180	1	217	2	24.6
1	902	1	198	10	10
1	2,210	1	800	43	653.9
1	667	1	308		
1	216	1	600		
1	144	1	336		
1	910	2	264		
3	600	2	82.5		
1	966	1	142.5		
1	825	19	16,658.5		
1	<u>2,072</u>				
22	13,991				

Ponds filled by pumping from Nong Harn Lake, and drained by gravity and pumping.

Reservoirs

Nong Harn Lake 48,000 rai

Extensive area available for cage culture in this lake.

Research Projects

1. Cyprinus carpio culture in floating cages.
2. Biological survey in Nong Harn Lake.

Transportation Facilities Available

1. Jeep, station wagon; purchased in 1970; good.
2. Jeep, land-rover; purchased in 1965; O, K.
3. Jeep, land-rover; purchased in 1965; O. K.
4. Jeep, pick-up; purchased in 1964; O, K.
5. Jeep, international; purchased in 1971; good.

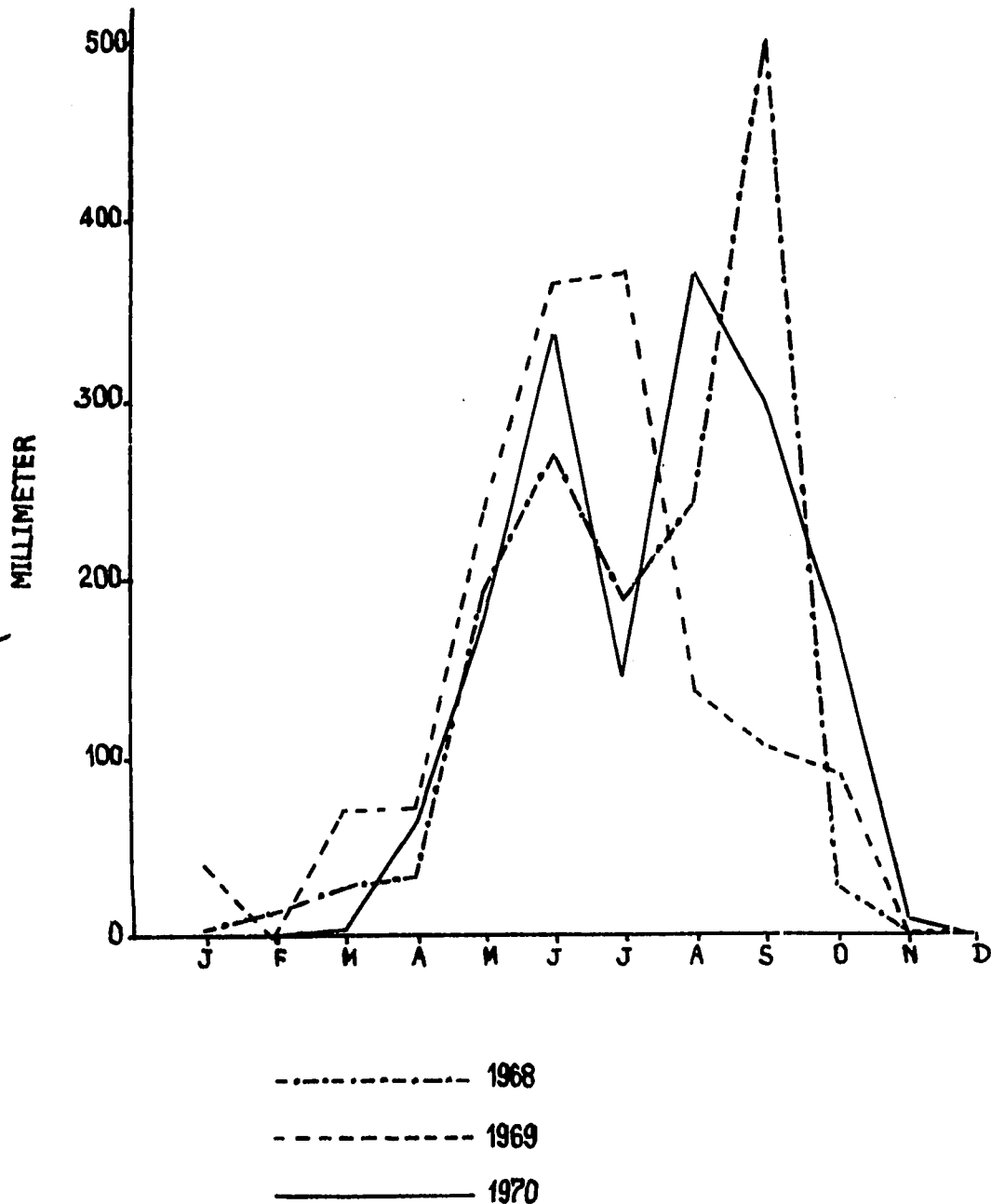
Equipment Available

- | | | | |
|----|-----------------------------------|-----|---------------------------------|
| 1. | 3 generators | 9. | 1 25 HP outboard motor and boat |
| 2. | 2 cameras, 35 mm | 10. | 2 movie projectors |
| 3. | 1 50 m seine | 11. | 1 refrigerator |
| 4. | 3 25 m seines | 12. | 2 water pumps |
| 5. | 7 plankton nets | 13. | 1 analytical balance |
| 6. | 10 aquaria | 14. | 1 electric pH meter |
| 7. | 1 Ekman dredge | 15. | 1 dissecting microscope |
| 8. | 1 compound microscope with camera | | |

MONTHLY RAINFALL

1968-1970

SAKON NAKHON



11.038 Surin Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Surin	1962	75.45 rai - land 21.09 rai - water	15 rai

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Uthai Phrommin	3 years at Kasetsart Univ.	1947
Biologists: Mr. Suin Ritcharung	B. S. Auburn Univ.	1968
Mr. Wattana Leelapatra	B. S. Kasetsart Univ.	1970
Extension: 6		
Laborers: 23 Permanent 6 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
26	200	10	50
5	800	<u>10</u>	<u>6</u>
<u>5</u>	<u>1,600</u>	20	560
36	17,200		

Water source is a small reservoir supplied by irrigation canal. Ponds are filled and drained by gravity.

Rice Paddy Fields

<u>16</u>	<u>600 m²</u>
16	9,600

Fish Production

<u>Species</u>	<u>1971 Number</u>
Pla Nai	256,311
Pla Nin	105,400
Pla Salid	<u>3,700</u>
	365,411

Research Projects

1. Common carp culture in rice fields.
2. Production of T. nilotica and C. carpio culture in pens in Kaset irrigation tank.
3. Pond culture of Pangasius sutchi combination with C. carpio and monosex of T. nilotica.
4. Stocking of C. carpio and T. nilotica in small impoundment, Sarae Boran, in Surin.

Transportation Facilities Available

1. Jeep, wagoneer; purchased in 1970; good.
2. Jeep, land-rover; purchased in 1962; fair.
3. Jeep, willy; purchased in 1966; fair.
4. Truck, dodge fargo; purchased in 1966; fair.
5. Truck, international crew-cab; purchased in 1971; good.

Equipment Available

- | | | | | | |
|-----|----|-----------------------|-----|---|-----------------------------|
| 1. | 1 | 100 m seine | 13. | 1 | refrigerator |
| 2. | 2 | 50 m seine | 14. | 1 | analytical balance |
| 3. | 3 | 25 m seine | 15. | 3 | spring balances |
| 4. | 3 | plankton nets | 16. | 5 | water pumps |
| 5. | 1 | profile projector | 17. | 1 | generator |
| 6. | 1 | stereo microscope | 18. | 1 | movie projector with screen |
| 7. | 1 | binocular microscope | 19. | 1 | amplifier |
| 8. | 1 | photomicrographic set | 20. | 1 | slide projector |
| 9. | 2 | seives | 21. | 1 | camera |
| 10. | 10 | aquaria | | | |
| 11. | 1 | air pump with filter | | | |
| 12. | 1 | electric pH meter | | | |

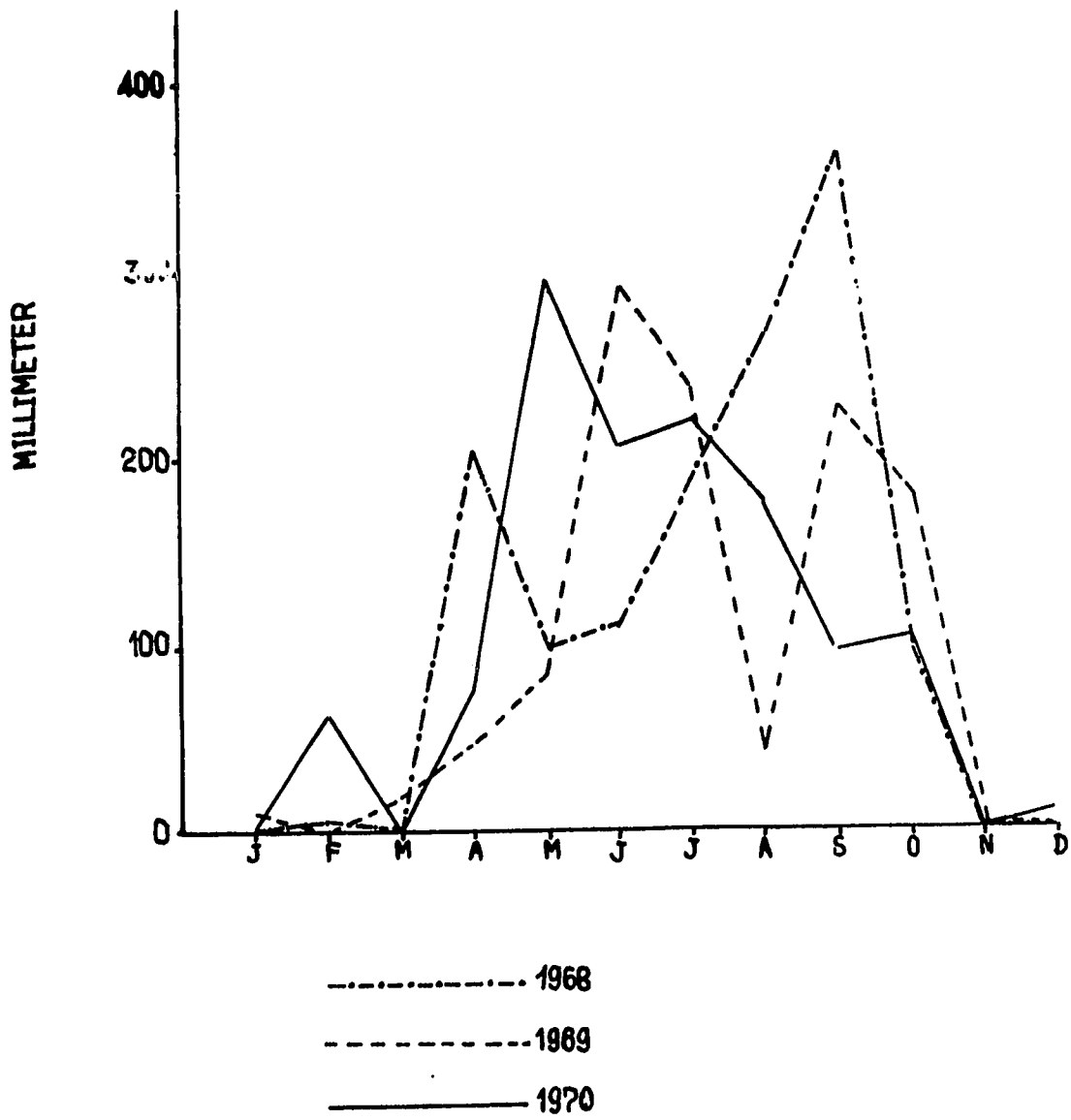
Equipment Needed

1. 1 analytical balance
2. 1 hot plate
3. 1 dissecting kit
4. 1 water analysis kit with colorimeter

MONTHLY RAINFALL

1968 - 1970

SURIN



11.039 Ubon Ratana Reservoir Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Nam Pong Province: Khon Kaen	1970	134 rai - land	Belongs to Electricity Generating Authority

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Sanay Pholprasith	B. S. Kasetsart Univ.	1964
Biologists: Mr. Somsak Janesirisak	B. S. Kasetsart Univ.	1970
Mr. Vichai Kongratanakosol	B. S. Kasetsart Univ.	1971
Mr. Charantada Karnasut	B. S. Kasetsart Univ.	1971
Extension: 3		
Laborers: 10 Permanent 47 Temporary		

Reservoirs

Ubon Ratana 256,250 rai

Fish Species Stocked

<u>Species</u>	<u>1971 Number</u>
Pla Yeesok	5,000
Pla Kam Cham	2,000
Pla Soong Hue	1,600
Pla Sawai	<u>4,000</u>
	12,600

Research Projects

1. Fish population in Ubon Ratana Reservoir.
2. Fish stocking in Ubon Ratana Reservoir.
3. Limnological survey.
4. An experiment on selecting the most efficient tagging method for fishes.
5. Life history studies on N. notopterus, Puntioplites proctozysron, and Cirrhinus jullieni.
6. Survey of spawning grounds of fishes.

Transportation Facilities Available

1. Jeep, wagoneer; purchased in 1971.
2. Jeep, willy; purchased in 1969; O. K.
3. Truck, international; purchased in 1970; O. K.
4. Boat, outboard motor; 9 HP; O. K. (unsafe in rough waters)

Equipment Available

1. 8 50 m seines
2. 8 100 m seines
3. 8 plankton nets
4. 5 aquaria
5. 1 electric pH meter
6. 1 analytical balance
7. 1 microprojector
8. 2 microscopes
9. 1 vacuum pump
10. 1 aqua analyzer
11. 1 centrifuge
12. 1 tele - thermometer
13. 1 recording thermometer
14. 1 water bath
15. 1 spectrophotometer
16. 1 air compressor
17. 1 electrically-heated still
18. 1 drying oven
19. 1 automatic titrator
20. 1 refrigerator
21. 1 movie camera
22. 1 movie projector
23. 2 80-100 HP outboard motor boats (on order)
24. 2 60 HP outboard motor boats (17') (on order)

11.040 Ubon Ratchathani Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Ubon Ratchathani	1954	57.25 rai - land 6 rai - water	None on station

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Montri Muangboon	3 years Vocational School	
Biologists: Mr. Chamrus Khantichitt	B. S. Kasetsart Univ.	1964
	Mr. Sanchai Sujaritvongsanondh	B. S. Kasetsart Univ. 1970
Extension: 11 Civil		
Engineers: 2		
Laborers: 27 Permanent 17 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
1	387.5	13	50
1	343	8	15
1	100.4	40	130
1	136	61	5,970
1	145.6		
1	171		
1	448.2		
1	304.2		
1	475.2		
1	375		
10	2,880.1		

Earthen ponds will not hold water because of sandy nature of soils.

Fish Production

Species

Pla Nai, Pla Salid, Pla Morted, and Pla Nin - 1,214,000

All fish produced in floating cages on Huey Muang Reservoir beside the Station.
This belongs to the Irrigation Department and furnishes water by pumping to the Station.

Research Projects

1. General survey on fishes and fishing gear in Moon River, Ubon Rajthani Province.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1964; O.K.
2. Jeep, land-rover; purchased in 1965; O.K.
3. Jeep, wagoneer; purchased in 1965; O.K.
4. Truck, dodge fargo; purchased in 1967; O.K.
5. Jeep, wagoneer, purchased in 1971; O.K.
6. Truck, international, purchased in 1971; O.K.

Equipment Available

- | | |
|-----------------------------|----------------------------------|
| 1. 2 100 m seines | 16. 3 motorcycles |
| 2. 6 50 m seines | 17. 2 profile projectors |
| 3. 2 25 m seines | 18. 1 current meter |
| 4. 9 plankton nets | 19. 40 aquaria |
| 5. 1 Kemmerer water sampler | 20. 3 air pumps with filter |
| 6. 8 stereo microscopes | 21. 1 16 HP inboard motor boat |
| 7. 2 compound microscopes | 22. 1 generator |
| 8. Projection equipment | 23. 1 transistor tape recorder |
| 9. 1 9 HP water pump | 24. 1 transistor amplifier |
| 10. 1 7 HP water pump | 25. 1 lab kit for water analysis |
| 11. 4 5 HP water pumps | 26. 1 camera (Canon) |
| 12. 1 13 HP longtail boat | 27. 1 refrigerator |
| 13. 1 analytical balance | 28. 1 500 gm capacity balance |
| 14. 11 thermometers | |
| 15. 1 electric pH meter | |

11.041 Udon Thani Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Udon Thani	1954	26.50 rai - land 10.75 rai - water	None on station

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Songsilpa Sutjaritkul	3 years Kasetsart Univ.	1949
Biologists: Mr. Chaichet Laojintanasri	B. S. Kasetsart Univ.	1968
Mr. Pipop Kamolrat	M. S. Michigan Univ.	1971
Extension: 9		
Civil Engineers: 2		
Laborers: 23 Permanent 24 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>				<u>Cement</u>	
1	1,350	10	200	<u>52</u>	<u>10</u>
1	1,092	1	1,230	52	520
2	726	1	814		
7	400	2	704		
1	360	1	946		
1	660	1	770		
1	528	2	1,032		
1	1,080	2	480		
2	102	2	800		
2	90	22	11,792		
19	9,706				

Rice Paddy Fields

<u>20</u>	<u>160 m²</u>
20	3,200

Fish Production

<u>Species</u>	1971	
	<u>Produced</u>	<u>Distributed</u>
Pla Nai	384,000	267,250
Pla Nin	431,250	243,250
Pla Salid	<u>123,700</u>	<u>62,700</u>
	938,950	573,200

Research Projects

1. The production of T. nilotica in paddy fields.

Transportation Facilities Available

1. Jeep; purchased in 1970; O. K.
2. Jeep, land-rover; purchased in 1965; O. K.
3. Jeep; purchased in 1965; O. K.
4. Truck, dodge fargo; purchased in 1967; O. K.
5. Jeep, international scout; purchased in 1971; O. K.

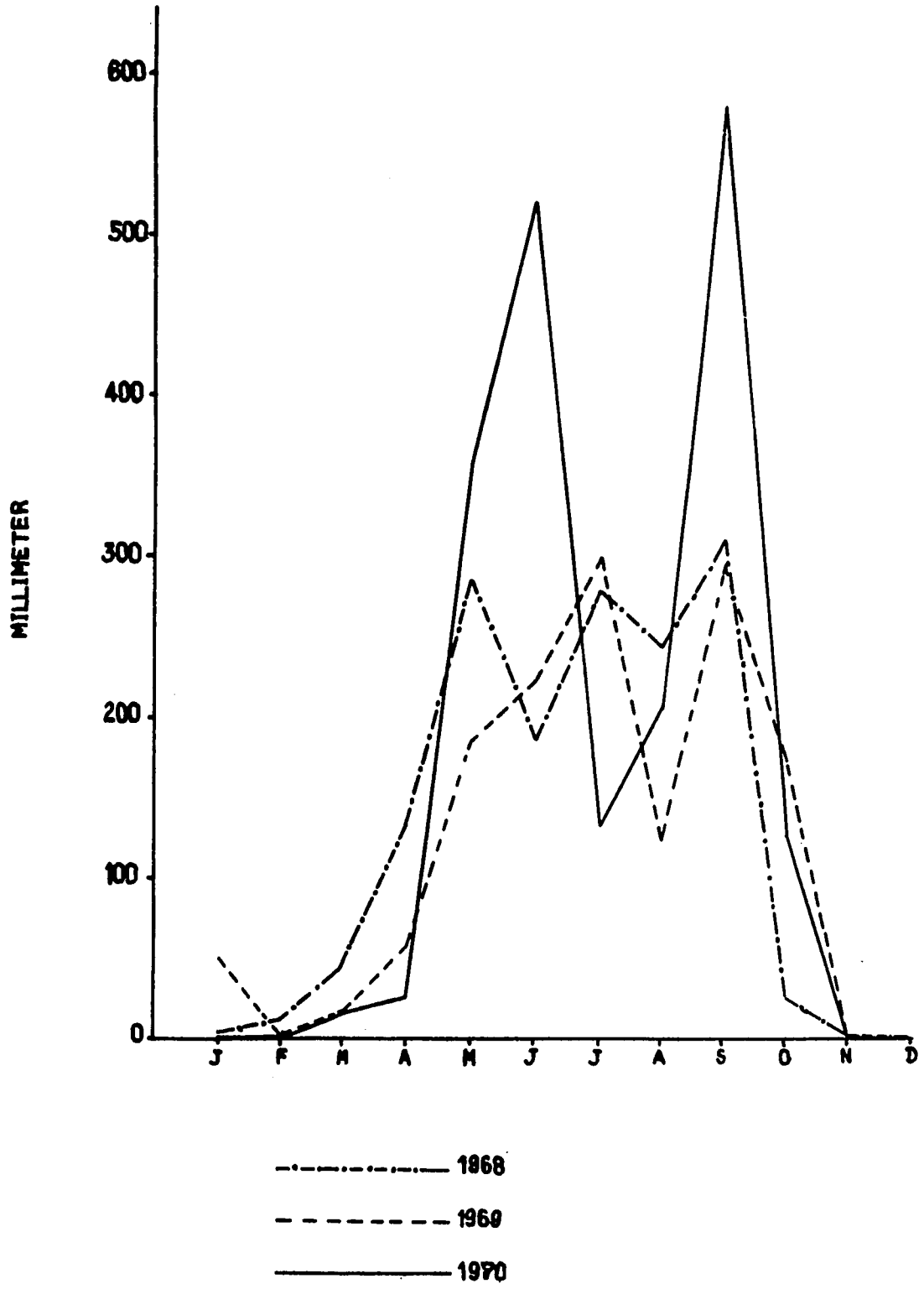
Equipment Available

- | | | | |
|-----|--------------------------------------|-----|---------------------------------|
| 1. | 3 motorcycles | 13. | 1 7 kg balance |
| 2. | 2 16-mm movie projectors with screen | | |
| 3. | 35 mm slide projector | 14. | 9 plankton nets |
| 4. | 1 transistor tape recorder | 15. | 1 profile projector |
| 5. | 2 transistor amplifiers | 16. | 20 aquaria |
| 6. | 1 pair of binoculars | 17. | 2 air pumps with filters |
| 7. | 1 35 mm camera | 18. | 1 9 HP water pump |
| 8. | 1 dissecting apparatus | 19. | 2 12 HP water pumps |
| 9. | 1 refrigerator | 20. | 1 7 HP water pump |
| 10. | 1 analytical balance | 21. | 2 5 HP water pumps |
| 11. | 1 500 gm capacity balance | 22. | 1 water analysis lab kit |
| 12. | 6 thermometers | 23. | 1 compound binocular microscope |
| | | 24. | 1 microscope substage lamp |
| | | 25. | 1 Kodak Instamatic camera |

MONTHLY RAINFALL

1968-1970

UDON THANI



11.04 Fisheries Stations in Central Thailand

11.041 Bangkhen Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Bangkhen Province: Bangkok	1937	38.00 rai - land 14.64 rai - water	None on station

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Samran Dhamrongrut	B. S. Kasetsart Univ.	1961
Biologists: Mr. Manu Potaros	M. S. Auburn Univ.	1965
Mr. Prasit Ketsunchai	B. S. Kasetsart Univ.	1961
Miss Kamolporn Thonguthai	B. S. Kasetsart Univ.	1965 (At Auburn)
Mr. Prasert Sitasit	B. S. Kasetsart Univ.	1966 (At Auburn)
Mr. Kamthorn Pothongkum	B. S. Kasetsart Univ.	1967
Mr. Pithaya Pennapaporn	B. S. Kasetsart Univ.	1967
Miss Viratada Smaksevee	B. S. Kasetsart Univ.	1968
Miss Supranee Bumrungsuk	B. S. Kasetsart Univ.	1969
Extension: 1		
Laborers: 54 Permanent 9 Temporary		

Number and Size (m²) of Ponds

<u>Earthen</u>		<u>Cement</u>	
1	345	1	784
1	560	1	896
1	520	1	732
1	224	1	793
2	200*	1	270
1	438	1	1,404
1	1,888	1	342
1	1,920	1	1,054
2	468	1	1,175
1	288	1	1,323
1	598	2	306
1	448	1	187
1	414	1	2,000
1	3,600	1	576
<u>1</u>	<u>587</u>	<u>15</u>	<u>12,148</u>
17	13,166		

*concrete side-earthen bottom

Current Research

1. Corn meal diets for feeding common carp.
2. The biology of German carp.
3. Embryological and morphological development of kissing gourami, Helostoma temminckii C. and V.
4. Biology of the sand goby, Oxyeleotris marmoratus (Bleeker).
5. Embryological and morphological development of the snakehead fish, Ophicephalus striatus Bloch.
6. Feeding climbing perch, Anabas testudineus (Bloch) with ground trash fish and pelleted feed.
7. Effect of antibiotic in the culture of Clarias batrachus Linn.
8. Diseases and parasites of Ophicephalus striatus Bloch, culture in ponds.
9. Seed production of different sizes of T. nilotica Linn.
10. Chironomus culture.
11. Feeding common carp with different formula feeds.
12. Using different forms of feeds for feeding common carp, C. carpio Linn.

Transportation Facilities Available

1. Jeep, willy; purchased in 1958; fair.
2. Volkswagen; purchased in 1962; O. K.
3. Nissan; purchased in 1963; O. K.
4. Truck, chevrolet; purchased in 1959; fair.
5. Truck, chevrolet; purchased in 1959; fair.
6. Truck, dodge fargo; purchased in 1962; O. K.

Equipment Available

- | | | | |
|-----|-----------------------------------|-----|-----------------------------------|
| 1. | 1 50 m seine | 25. | 1 50 kg scale sensitive to 500 gm |
| 2. | 2 30 m seines | 26. | 25 aquaria |
| 3. | 1 25 m seine | 27. | 1 10 cu. ft. refrigerator |
| 4. | 6 net cages | 28. | 5 plankton nets |
| 5. | 1 dissecting microscope | 29. | 1 shadow graph |
| 6. | 10 compound microscopes | 30. | 1 current meter |
| 7. | 1 analytical balance | 31. | 1 water distillation machine |
| 8. | 6 600 gm scales sensitive to 2 gm | 32. | 1 turbidity machine |
| 9. | 5 1 kg scales sensitive to 5 gm | 33. | 1 centrifuge |
| 10. | 1 7 kg scale sensitive to 20 gm | 34. | 1 5 HP gasoline pump |
| 11. | 1 10 kg scale sensitive to 5 gm | 35. | 1 5 HP gasoline pump |
| 12. | 1 15 kg scale sensitive to 100 gm | 36. | 1 6 HP gasoline pump |
| 13. | 1 drying oven (max. 65 C) | 37. | 1 9-12 HP diesel pump |
| 14. | 1 temperature recorder | 38. | 1 air pump (3-5 aquaria) |
| 15. | 1 oxygen meter | 39. | 2 pellet machines |
| 16. | 1 magnetic stirrer | 40. | 1 mixer |
| 17. | 1 lab pH meter | 41. | 1 grinder |
| 18. | 2 autoclaves | 42. | 1 cutting machine (for feeds) |
| 19. | 2 calorimeters | | |
| 20. | 1 electric calculator | | |
| 21. | 1 barometer | | |
| 22. | 2 1 HP electric pump | | |
| 23. | 2 3 HP gasoline pump | | |
| 24. | 1 4-5 HP diesel pump | | |

11.042 Chai Nat Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Sunphaya Province: Chai Nat	1959	48 rai - land 17 rai - water	51 rai

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Prasit Aguru	M. S. Auburn Univ.	1966
Biologists: Mr. Pisan Choangpanich	B. S. Kasetsart Univ.	1966
Mr. Manop Tungtrongpiroj	B. S. Kasetsart Univ.	1966
Extension: 4		
Laborers: 23 Permanent		
2 Temporary		

Number and Size of Ponds

<u>Earthen</u>	<u>Cement (m²)</u>
29 200m ² 2 1 rai	10 50
14 400m ² 2 1	10 5
10 800m ²	20 550
10 200m ²	
2 800m ²	
2 400m ²	
67 23,800	

Fish Production

<u>Species</u>	<u>1971 Number</u>
Pla Nai	255,000
Pla Nin	368,000
Pla Salid	38,100
	<u>661,100</u>

Research Projects

1. Pangasius sutchi culture in floating cages.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1964; fair.

Equipment Available

1. 1 200 m seine
2. 1 100 m seine
3. 2 50 m seines
4. 2 25 m seines
5. 5 plankton nets
6. 1 Ekman dredge
7. 1 Kemmerer water sampler
8. 1 compound microscope
9. 1 dissecting microscope
10. 10 aquaria
11. 1 analytical balance
12. 1 current meter
13. 1 500 gm capacity balance
14. 1 200 gm capacity balance

Ditch and Dike Unit

Head:	Mr. Paitoon Srisomsap	B. S. Kasetsart Univ.	1964
Biologists:	Mr. Chaiwatana Parnpromintr	B. S. Kasetsart Univ.	1966
	Mr. Somsuk Luanpreeda	B. S. Kasetsart Univ.	1968
	Mr. Suebpong Chatmalai	B. S. Kasetsart Univ.	1970
Extension:	14		
Laborers:	16 Permanent		
	2 Temporary		

Number and Size (m²) of Rice Paddy Fields

$\frac{9}{9} \frac{800}{7,200}$

Research Project

1. Paddy field culture of Puntius gonionotus Bleeker after harvesting season.

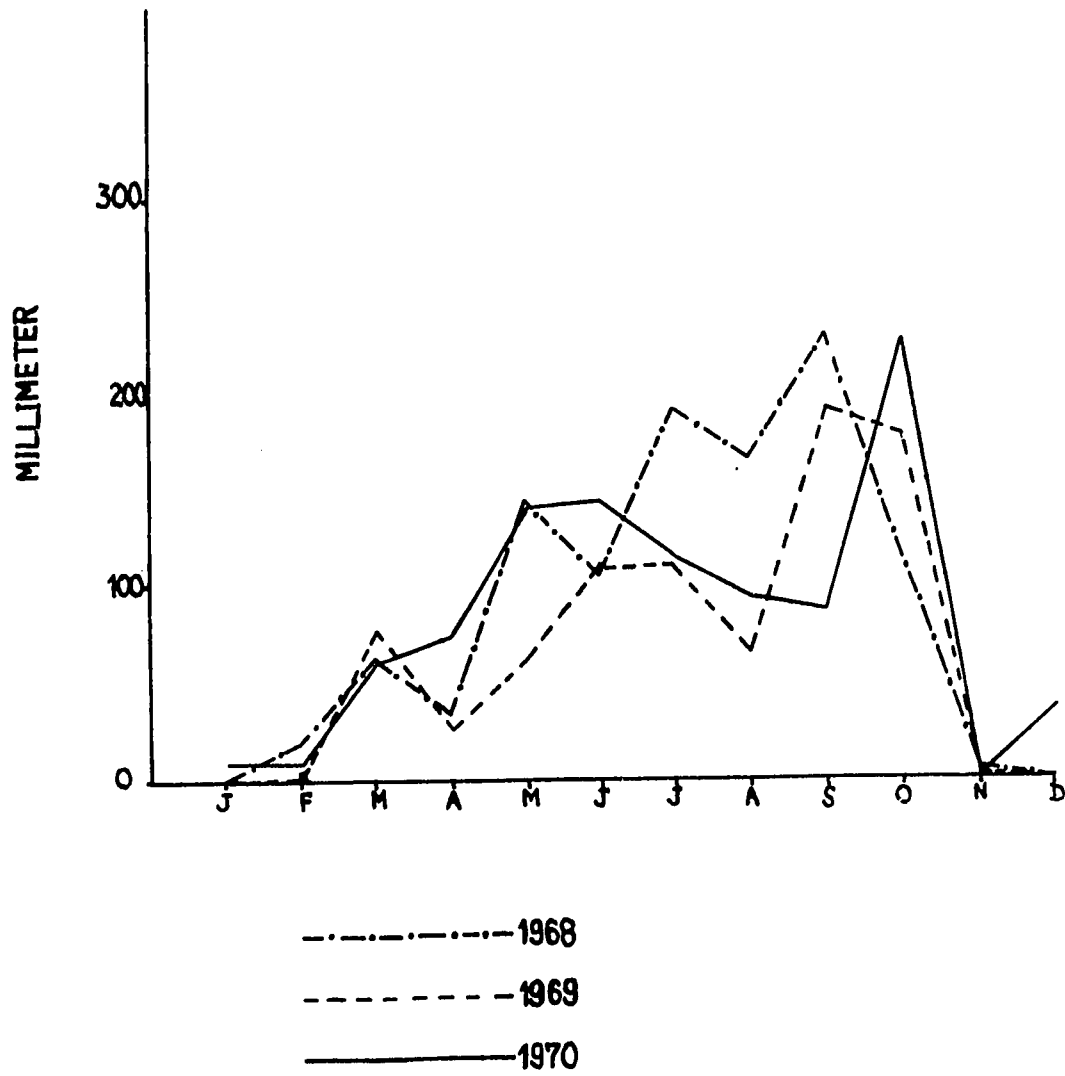
Transportation Facilities Available

1. Jeep, land-rover

MONTHLY RAINFALL

1968 - 1970

CHAI NAT



11. 043 Nakhon Sawan Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang	1927 (dam)	35 rai - land	None on station
Province: Nakhon Sawan	1930 (station)	17 rai - water	

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Vinus Boonyaratplin	B. S. Kasetsart Univ.	1962
Biologists: Mr. Khemchat Nimsomboon	B. S. Kasetsart Univ.	1964
	Mr. Suchin Thongmee	B. S. Kasetsart Univ.
Mr. Oopatham Pawaputanan	B. S. Kasetsart Univ.	(At Auburn)
Extension: 3		
Laborers: 59 Permanent		
	8 Temporary	

Number and Size (m²) of Ponds

<u>Earthen</u>				<u>Cement</u>	
1	331	1	1,040	1	331
1	396	1	680	1	576
1	1,400	1	660	2	907
1	1,081	1	840		
1	268	5	396		
1	576	1	1,064		
6	4,052	10	6,264		

Ponds filled and drained by pumping.

Reservoirs

Bung Bora Pet 132,737 rai (water supply for Station)

Fish Production

<u>Species</u>	<u>1971</u> <u>Number</u>
Pla Nin	105,000

Research Projects

1. Experiments on raising Pla Sawai in floating cages.
2. Study on life history of Pla Sua Taw.
3. Survey on general environment conditions of Bung Bora Pet.
4. Species composition and standing crop of fish fauna surveys in Bung Bora Pet.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1965; poor.

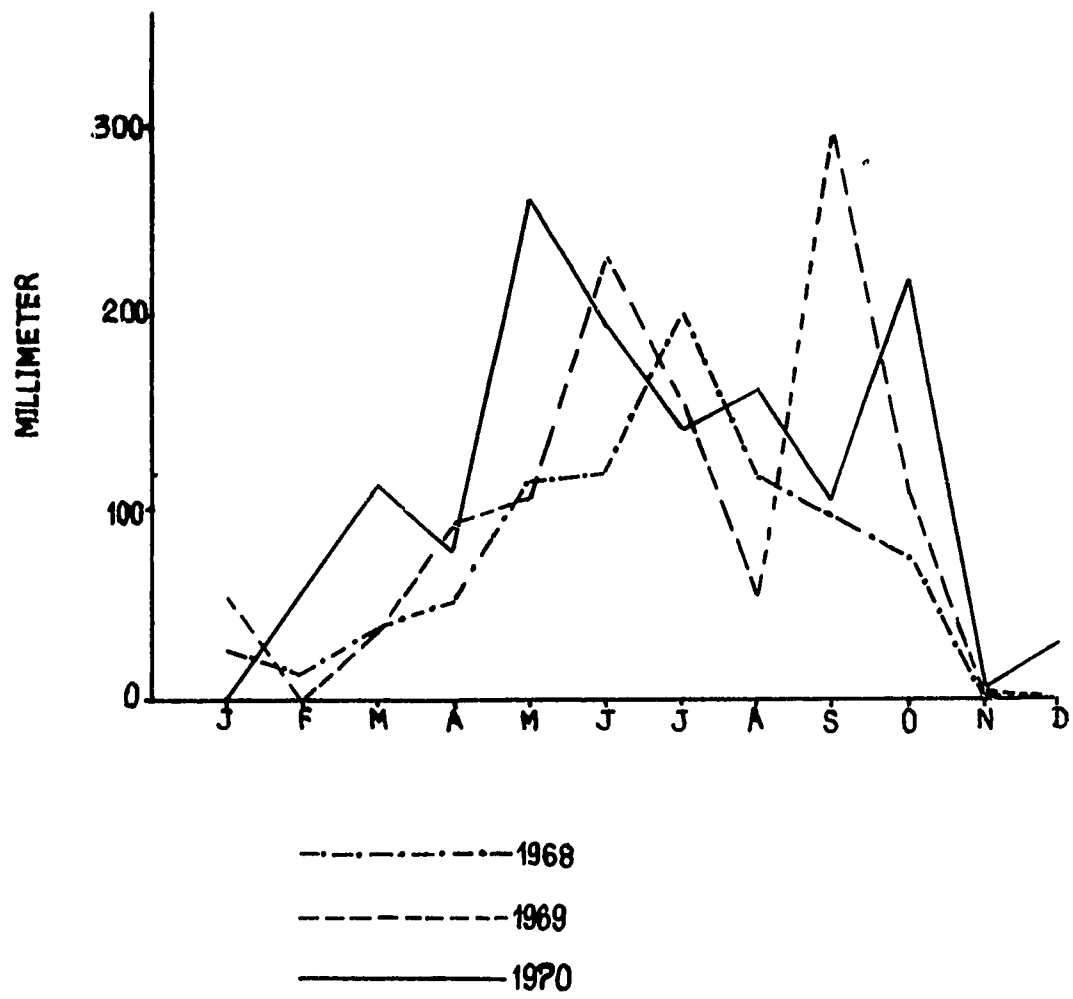
Equipment Available

1. 1 50 HP longtail boat
2. 1 20 HP inboard motor
3. 1 200 m seine
4. 1 50 m seine
5. 10 aquaria
6. 2 Ekman dredges
7. 3 air pumps
8. 3 dissecting apparatus
9. 1 microscope
10. 1 oven
11. 1 current meter
12. 1 5-10 gm capacity balance
13. 1 12 HP pump
14. 1 9 HP pump
15. 1 10 KVA generator
16. 1 binocular microscope
17. 1 chemical balance

MONTHLY RAINFALL

1968 - 1970

NAKHON SAWAN



11.05 Fisheries Stations in South Thailand

11.051 Chanthaburi Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Khlung Province: Chanthaburi	1958	50 rai - land 250 rai - water	200 rai

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Saman Pumiphul	B. S. Kasetsart Univ.	1968
Biologists: Mr. Visunt Meesawat	B. S. Kasetsart Univ.	1965
Mr. Boonsong Sirikul	B. S. Kasetsart Univ.	1968
Extension: 2		
Laborers: 10 Permanent 15 Temporary		

Number and Size of Ponds

Earthen

2	50 rai	2	800 m ²
2	25 rai	4	200 m ²
4	2 rai	6	2,400
8	158		

Research Projects

1. Experiments on rearing shrimp.
2. Experiments on blue crab, Scylla serrata Forskal in cages.
3. Combination pond culture of Lates calcarifer and T. mossambica at Chanthaburi Station.
4. Preliminary studies on life history of Mugil dussumieri Cuv. & Val.

Transportation Facilities Available

1. Jeep, land-rover; purchased in 1963; fair.
2. Boat, inboard motor; 50 HP; 11 m long; purchased in 1961.
3. Boat, inboard motor; 7 HP; 8 m long; purchased in 1958; fair.
4. Boat, outboard motor; 6 HP; 10 ft. long; purchased in 1966; no good.
5. Boat, outboard motor; 28 HP; 10 ft. long; purchased in 1967; no good.

Equipment Available

1. 2 dissecting microscopes
2. 1 compound microscope
3. 1 current meter
4. 4 plankton nets
5. 1 Ekman dredge
6. 1 analytical balance (poor condition)
7. 10 aquaria
8. 1 10 KVA generator
9. 1 5 KVA generator
10. 1 1 KVA generator
11. 1 300 watt portable generator
12. 1 5 HP pump
13. 1 50 m seine
14. 1 25 m seine
15. 1 flow meter

Equipment Needed

1. 1 pH meter
2. 1 analytical balance
3. 1 150 HP inboard motor boat; 12 m long
4. 1 15 HP longtail boat
5. 1 50 KVA generator

11. 052 Pattani Station

Location

Amphoe: Muang
Province: Songkhla

Personnel

Head: Mr. Pramot Wanichagorn
Biologists: Mr. Yut Huntsopa
Mr. Manot Benchagan
Mr. Artit Namasonti

Training

	<u>Year</u>
B. S. Kasetsart Univ.	1956
B. S. Kasetsart Univ.	1968
B. S. Kasetsart Univ.	1970
B. S. Kasetsart Univ.	1970

Extension:
Laborers:

Number and Size (m²) of Ponds

Earthen

10	400
30	200
<u>6</u>	<u>800</u>
46	14,800

Cement

<u>20</u>	<u>10</u>
20	200

116 ponds are planned

Reservoir

Not constructed 10 rai

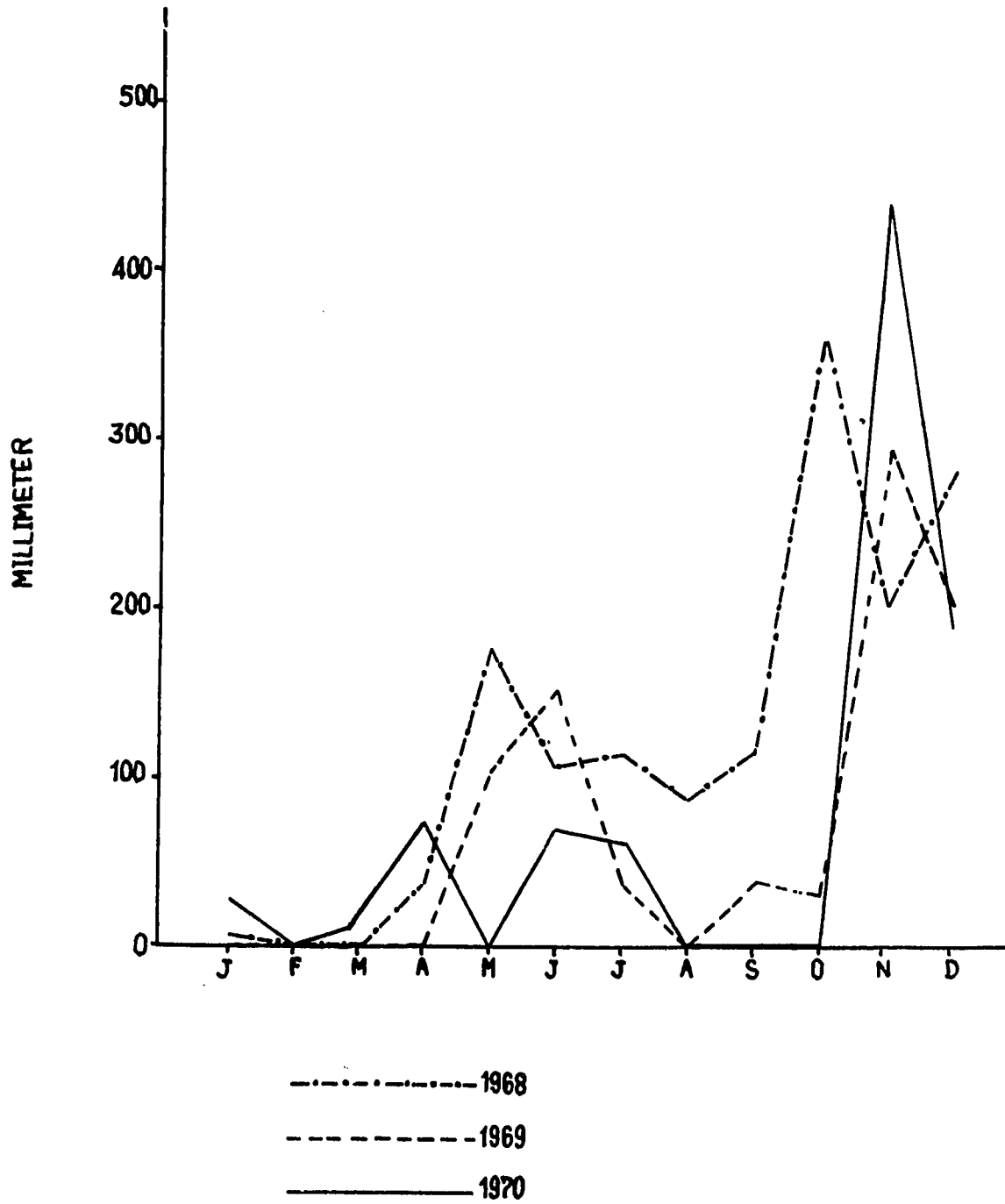
Fish Raised

Pla Nai	5,000
Pla Nin	10,000
Pla Salid	<u>3,000</u>
	18,000

MONTHLY RAINFALL

1968-1970

PATTANI



11. 053 Prachuap Khiri Khan Coastal Station

<u>Location</u>	<u>Established</u>	<u>Area</u>	<u>Available for Expansion</u>
Amphoe: Muang Province: Prachuap Khiri Khan	1954	135.25 rai - land 44.57 rai - water	

<u>Personnel</u>	<u>Training</u>	<u>Year</u>
Head: Mr. Uthai Suntarotok	3 years at Kasetsart Univ.	
Biologists: Mr. Boonchuey Chaopaknam	B. S. Kasetsart Univ.	1964
Mr. Amnuay Tanthong	B. S. Kasetsart Univ.	1964
Extension: 6		
Laborers: 12 Permanent 10 Temporary		

Number and Size (m²) of Ponds

Earthen

1	17,600
1	11,200
2	6,400
7	1,600
2	800
2	400
4	200
<u>14</u>	<u>100</u>
33	57,400

Reservoirs

Kaotao in Hua Hin	200 rai
Bangnangrom in Muang	3,125 rai
Nontamsao in Bansaphan	200 rai

Research Projects

1. Combination pond culture of Lates calcarifer and T. mossambica at Prachuap Khiri Khan Fisheries Station.
2. Life history of mullets.
3. Comparison of oysters at Klong Wan Bay and Paknam Pran Buri.

Transportation Facilities Available

1. Jeep, willy; purchased in 1953; no good.
2. Jeep, land-rover; purchased in 1968; O.K.
3. Truck, purchased in 1953; no good.
4. Boat, outboard motor; 5 HP.

Equipment Available

1. 1 profile projector
2. 1 binocular microscope
3. 1 electric balance - 200 gm
4. 1 plankton net
5. 1 salinometer
6. 1 dissecting apparatus
7. 1 underwater thermometer recorder
8. 1 electric pH meter
9. 2 balances - 500 gm
10. 1 Ekman dredge
11. 2 sieves
12. 1 electric centrifuge

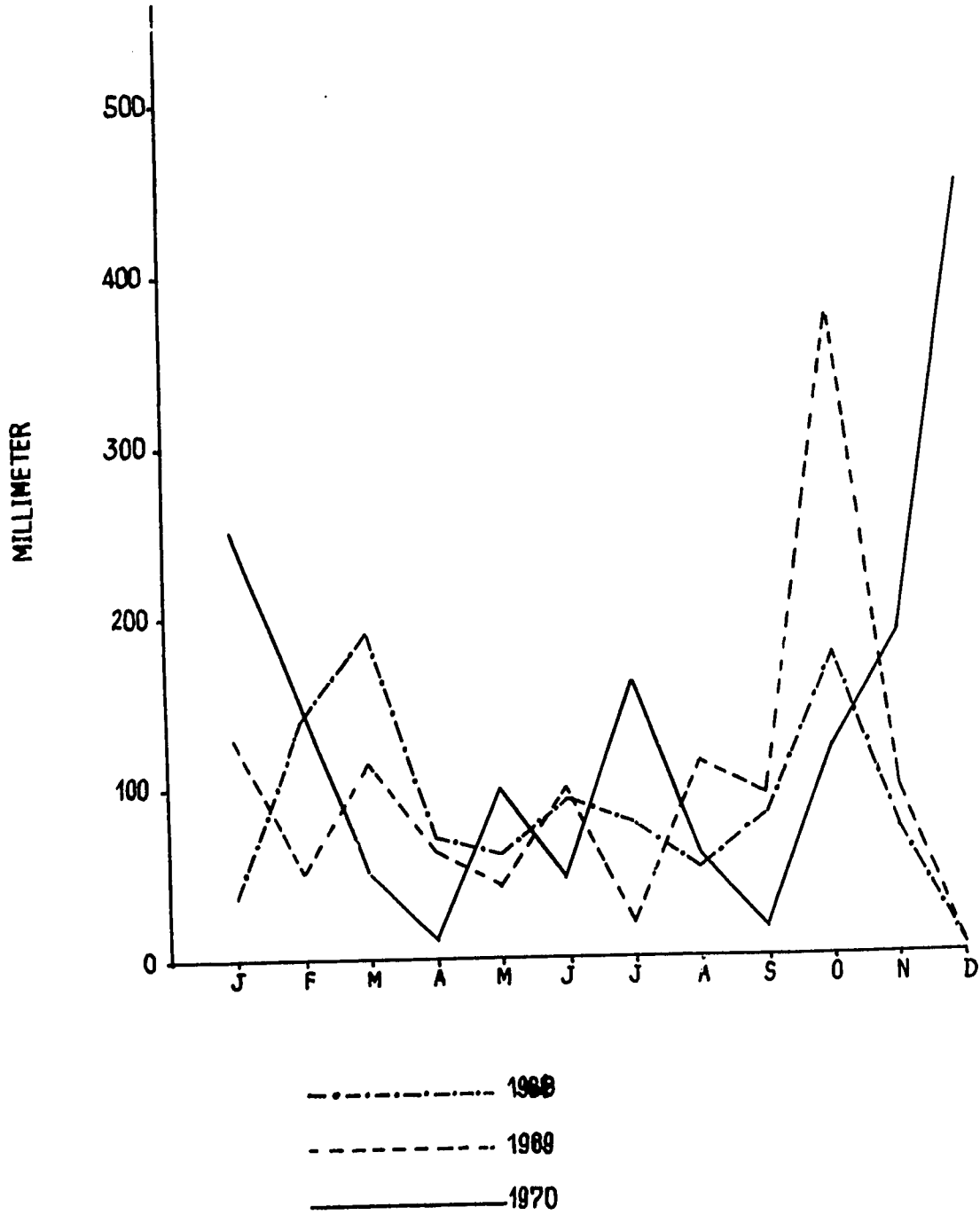
Equipment Needed

1. 1 truck
2. 1 jeep
3. 1 camera
4. 1 amplifier

MONTHLY RAINFALL

1968-1970

PRACHUAP KHIRI KHAN



12.0 FISHERIES STATISTICS¹

12.01 Catch of fish in tons, 1961 - 1969

Year	Marine	Freshwater	Total
1961	233,275	72,475	305,750
1962	269,709	70,079	339,788
1963	323,374	70,481	393,855
1964	494,196	82,790	576,986
1965	529,493	85,637	615,120
1966	635,165	85,117	720,282
1967	762,187	85,256	847,443
1968	1,004,058	85,245	1,089,393
1969	1,179,595	90,439	1,270,034

12.02 Sale price (baht/kg) of freshwater fish at Bangkok Auction, 1964 - 1969

Fish	1964	1965	1966	1967	1968	1969
<u>Anabas testudineus</u>	5.8	4.8	7.8	3.4	5.4	6.0
Carps	4.0	3.8	4.3	4.2	4.7	5.0
<u>Clarias sp.</u>	9.5	10.0	11.5	8.8	8.7	10.0
<u>Fluta sp.</u>	8.5	9.5	7.8	3.4	7.9	9.0
<u>Notopterus chitala</u>	6.3	7.3	8.0	7.8	8.9	7.0
<u>N. notopterus</u>	4.3	5.5	6.0	6.2	7.9	7.0
<u>Ophicephalus micropeltes</u>	6.0	5.5	5.0	6.3	7.7	7.0
<u>O. striatus</u>	9.5	10.0	10.5	9.0	11.3	11.0
<u>Pangasius sp.</u>	5.3	5.3	6.0	6.7	6.5	5.5

1. From: Fisheries Record of Thailand, 1969. Statistics Section, Department of Fisheries; 46 pages.

12.03 Freshwater fish and prawn catch in 1967, 1968, and 1969 (in tons)

Fish	1967	1968	1969
<u>Anabas testudineus</u>	7,584	9,965	6,882
Chinese carps	-----	378	596
<u>Clarias sp.</u>	14,117	13,897	18,323
<u>Cyprinus carpio</u>	-----	7,354	8,073
<u>Fluta sp.</u>	-----	1,123	1,146
<u>Macrobrachium sp. (prawns)</u>	3,738	4,008	3,898
<u>Ophicephalus striatus</u>	17,881	17,176	15,410
<u>Pangasius sp.</u>	767	955	1,071
<u>Trichogaster pectoralis</u>	4,652	5,677	8,080

12.04 Uses of freshwater fishes and shrimps

Uses	Tons
Fresh	49,398
Fermented	19,253
Dry-salted	9,157
Smoked	4,594
Fish sauce	1,707
Shrimp paste	296
Fish meal	178
Dried shrimp	77
Fertilizer	26
Other	623

12.05 Shrimp Culture in Thailand (Summary)¹

A total of 1,003 farmers operate 46,259 rai (18,500 acres) of coastal shrimp farms. Yield average is 54.2 kg/rai/year for a total yield of 2,500,000 kg of cultured shrimp per year. At 25 baht/kg, value for this production is 62,500,000 baht. Area available for expansion is about 3,000,000 rai.

12.06 Export - Import of Fish 1969

Item	Tons	
	Export	Import
Fresh fish	17,946	1,720
Salted fish	2,665	733
Other	-----	6,191
Mussels	<u>110</u>	<u>-----</u>
Total	20,781	9,644

12.07 Extension: Number of fish farmers, area cultured and number of fish stocked, 1969.

Item	Ponds Ponds	Paddies	Ditches	Cages	Total
Number of farmers	9,201	1,348	276	210	11,115
Area cultured m ²	6,189,300	28,017,600	730,000	13,000	34,950,100
Number fish stocked	11,576,500	3,347,000	573,400	919,000	16,415,900

¹ From Banchong Tiensongrusmee: 1970. The present status of shrimp farming in Thailand, Invertebrate Fisheries Investigations, Department of Fisheries Contribution, No. 18. 34 pages, June, 1970.