28990 Investigation of Environmental Change Pattern in JAPAN

A Study on Change of Environmental Condition of ISE BAY USING LANDSAT DATA

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Quaterly Report

May,10 ,1976

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1. Introduction

Ise Bay plays a very important role in the Central Japan.
It is an indispensable exsistance for the people who live in the area centering around Nagoya.

Needless to say,the Bay has a limitted spaces,therefore,its efficient utilization under strict restriction and order is required. As matter of fact,there have already occured some environmental problems that must be urgently solved.

Many investigators and reserchers were made mainly from the view points of draining from chemical factories and power stations in and around that area, and of urban drainages from Nagoya and other cities.

Lately,however,it it recognized to be very important to observe the problem more widely in the relation to the Nobi Plain streching behind the area,and to the three big rivers of Kiso,Nagara,and Ibi,running through the plain.

In the Nobi Plain, which is the second large plain in Japan, the natural environment has been greatly transformed by the remarkable urbanization and the change of agricultural method

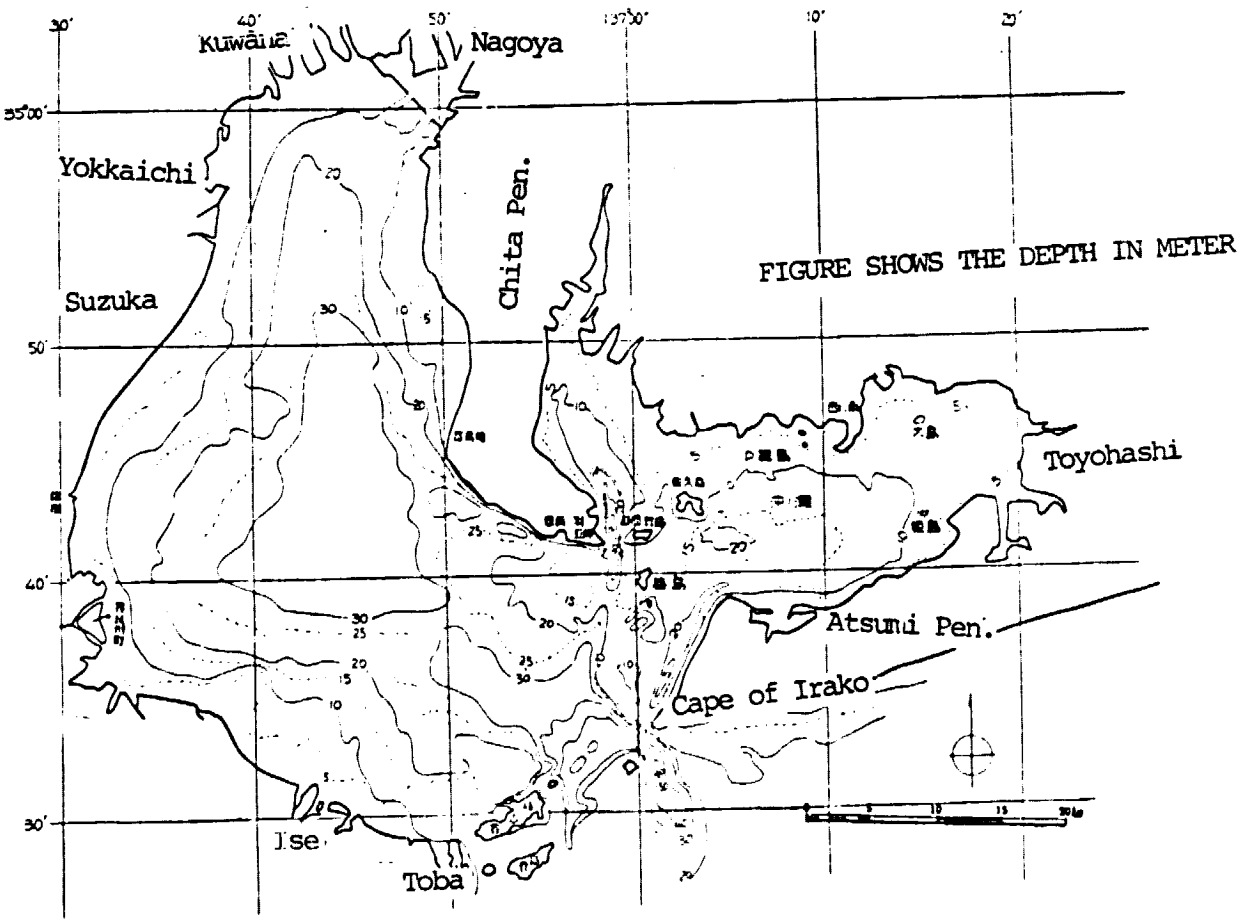
In this present circumstances,LANDSAT DATA becomes to play an important part decidely. We have recently started investigation and analysis as to how different data we can get according to the reasons using LANDSAT 1 and 2 materials of this area.

2. Techniques

In order to promote this research, we firstly intend to collect the obtained by now, and compare them with the LANDSAT data.

The outline of data obtained is following;

CONFIGURATION OF BOTTOM IN ISE BAY



1. DATA OF ISE BAY

Total Area : 330 sq.km. Total Volume: Fifty Billon M (assumed average deapth as 15m)

Volume of Sea Water going in and out in each Tide: Eight Billion M

This corresponds to 1/6 of total volume of Ise Bay

2. DATA OF THE THREE PREFECTURES LOCATED AROUND ISE BAY

	TOTAL AREA		FOREST		PADDY FIELD		POPULATION		INDUSTRIAL PRODUCTION	
	KM^2	%	KM^2	%	KM^2	%	THOUSAND	%	BILLION YEN	%
MIE	4690	81.3	1758	75.6	633	93.1	1355	89.5	560.1	97.7
GIFU	7409	69.9	6109	69.7	579	90.5	1566	92.1	442.4	95.3
AICHI	5064	100	2441	100	888	100	4799	100	2623.2	100
TOTAL	17163	79.9	10308	76.1	2178	95.2	7720	96.3	3625.7	99.0
RATIO TO THE COUNTRY	4.6%		24.6%		24.6		8.0%		———	

3. Main Rivers flowing into the Ise Bay

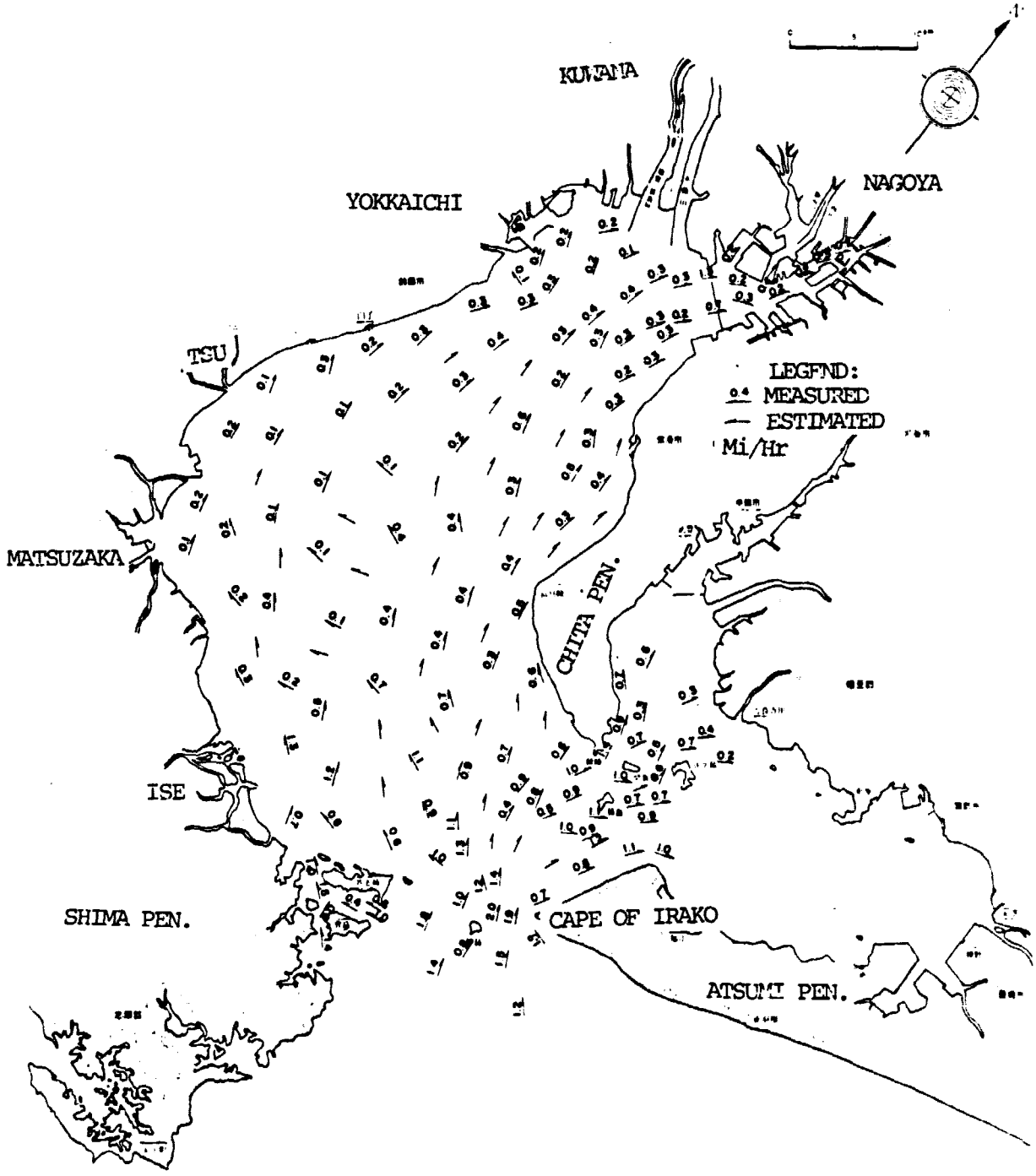
Name of River	Catchment Area KM	Max. Discharge M^3/S	Droughty Dischaege M^3/S	Mean Discarge M^3/S	Discharge per Day million t	Discharge per Year billion t
KISO	5275	14000	68	240	20	7.5
Nagara	1985	4500	12	103	9	3.2
Ibi	1840	7000	16	108	9	3.4
Yahagi	1830	4700	19	55	5	1.7
Toyo	703	3800	4	37	3	1.2
Miya & Others	---	----	20	60	5	1.6
Total	----	-----	193	603	51	18.8

Mean of Total Discharge per Day is 5.1 million tons per Day

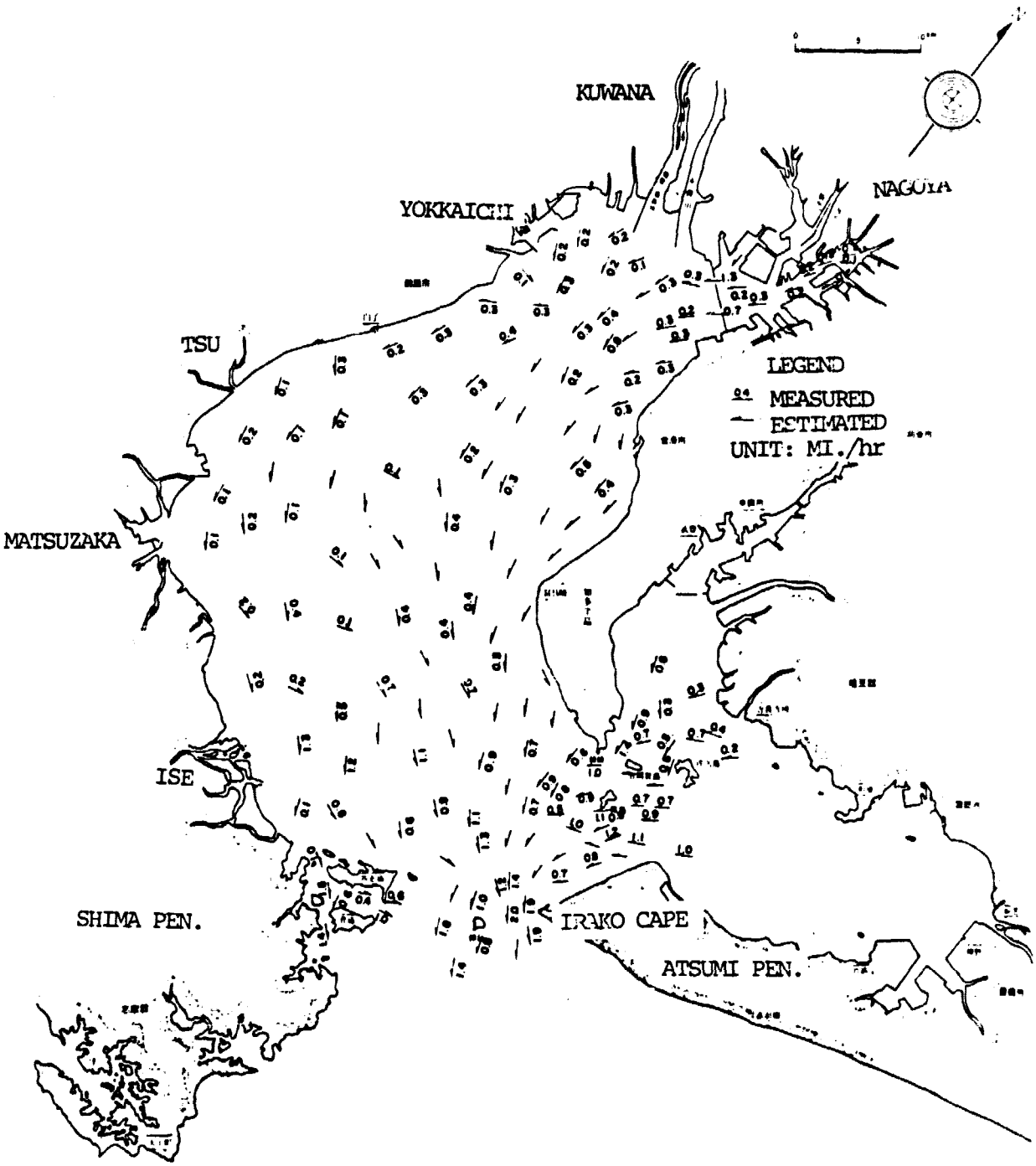
THis corresponds to 1.0 % of the total volume of ISE BAY

Mean of total annual discharge is about 18.8 billion tones and this is 38% of the volume of Ise Bay.

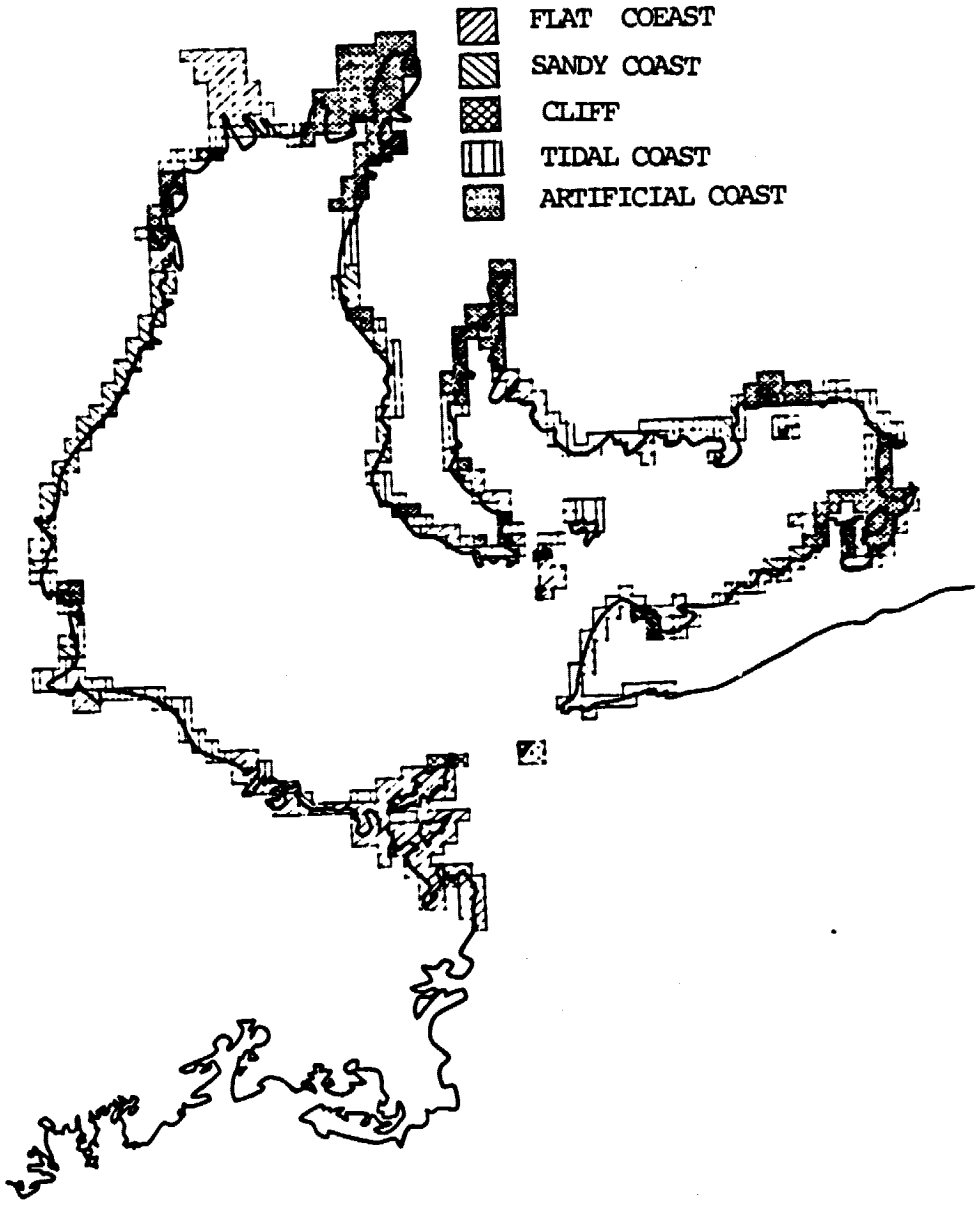
VECTOR OF THE STRONGEST STREAM TOWARD NORTH-WEST
THROUGH THE IRAKO CHANNEL



VECTOR OF THE STRONGEST STREAM TOWARD SOUTH-EAST
THROUGH IRAKO CHANNEL



TYPE OF COAST



Sourse of Pollution

Domestic Drainage

Sewage N 11g/day P: 0.9 g/day Synthetic Detergant: 15 g/day for each person

Estimated P content in detergent is 6 %. Total sewage of one person will be

N; 11g/day P : 1.8 g/day . As a population along Ise Bay is about 7.72 million,

total sewage will be N: 85 ton/day P: 14 ton/day

Cattle

Cow N; 280g/day P; 56g/day
Pig N; 31g/day P; 20 g/day

Incase of cow 90% of P will be restored and used as a compost

Forest

Due to the deterioration of all living thing N and P are produced and drained into the river.

N; 1.9kg/day /km P; 0.05 kg/day/km
Total area 13500 km

Industrial Drainage

Pollutant materials largely varies with the kind of works

	Processing work of farm products	Slaughterhouse	Leather work	Beer work	Paper work	dye work
BOD ppm	200-300	838	296	611	2500 3900	1020 3700
N ppm	20-80	145	57	156	50 165	7 22
P ppm	1-80	8	--	20	--	--

Industrial sewage is estimated totally 17 million ton/day

Paddy Field

Annual comsumption of fertilizer is annually

MIE Prefecture	180 thousand ton
GIFU Prefecture	165 thousand ton
AICHI Prefecture	255 thousand ton
Total	500 thousand ton

Suitable fertilization Kalium perphosphoric acid and Nitrogen compound each 100kg/ha

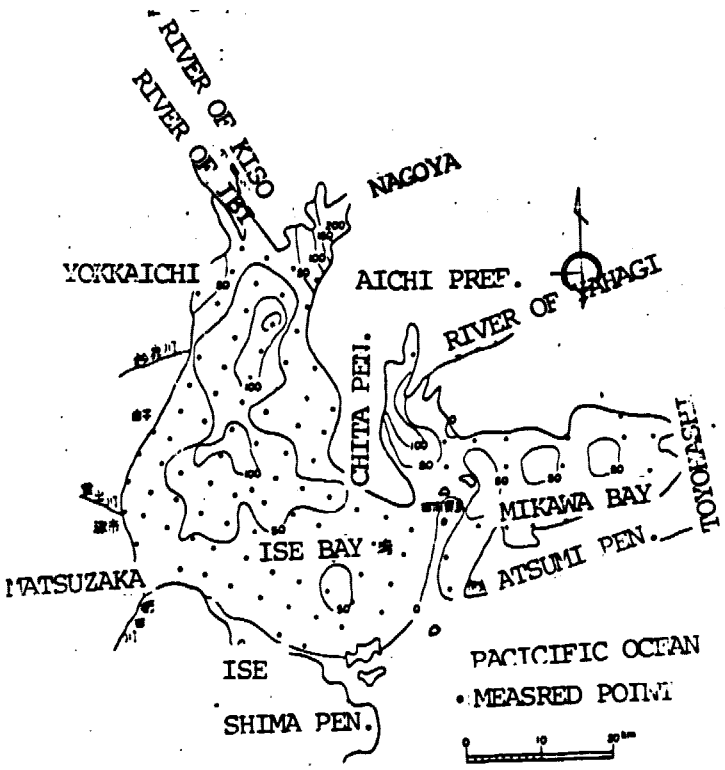
Kalium compound 90kg/ha

Due to these fertilizers content of N in each ha will be 20 kg/ha and P will be 40 kg

In a early time, nitrogen will remain as Nitrgen acid state, thereafter these change to Ammonium stata and will be absorbed to bacterial algae.

Loss of fertilizer is estimated N : 25% P;5 %

EQUAL THICKNESS LINE OF SLUDGE SEDIMENTATION

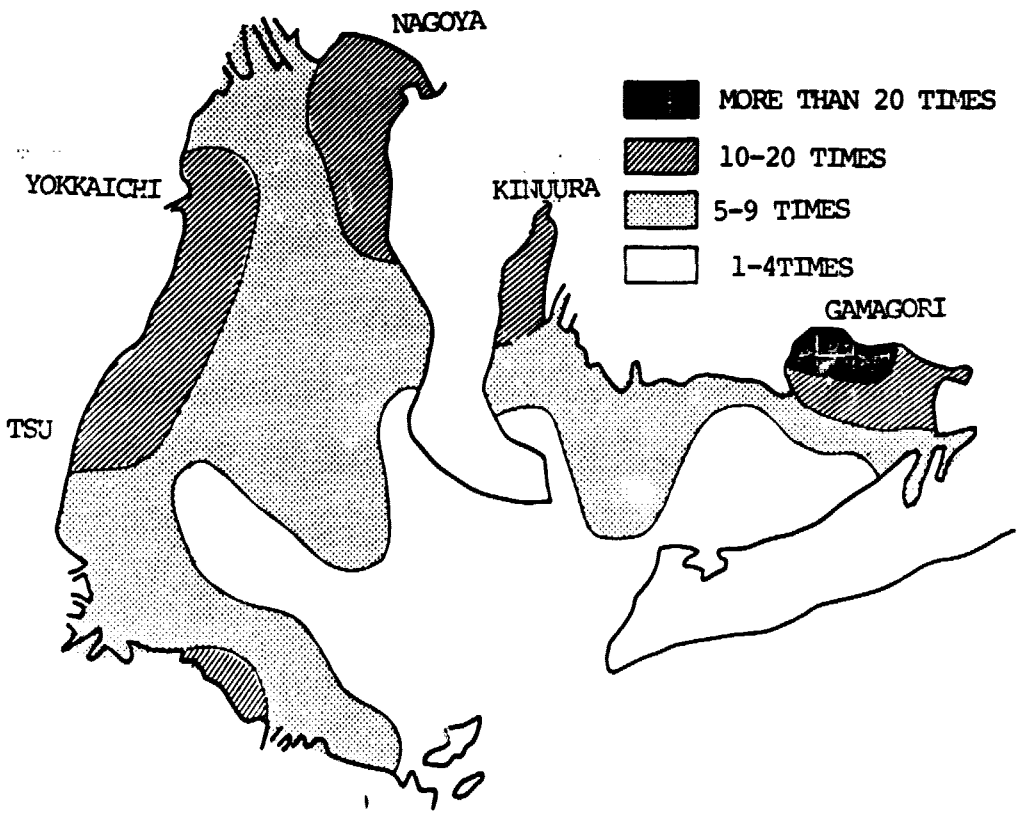


RECORD OF RED TIDE

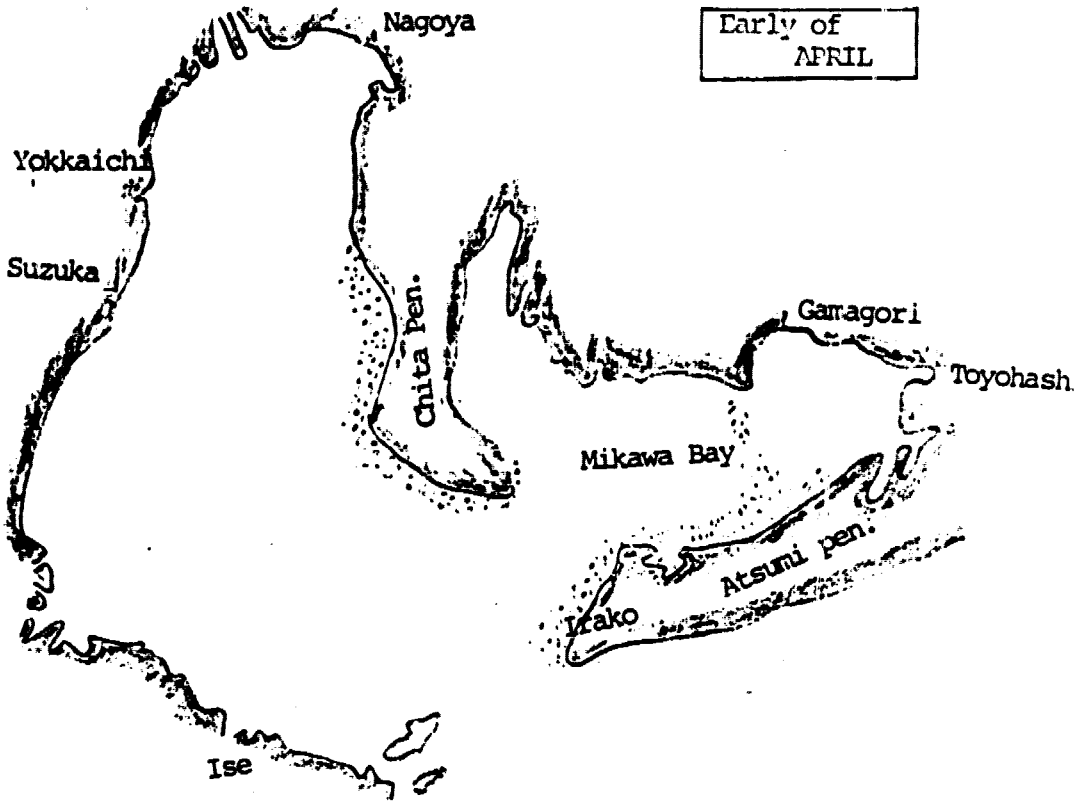
Red tide appeared about 214 times within a period of 1971-74,and distinctly concentrated near Nagoya harbour,Yokkaichi and Tsu, Kinuura bay and coast of Gamagori. And red tide occured at all season except a very short period of winter,but much occurrance can be seen in a season of high temperature and low water.

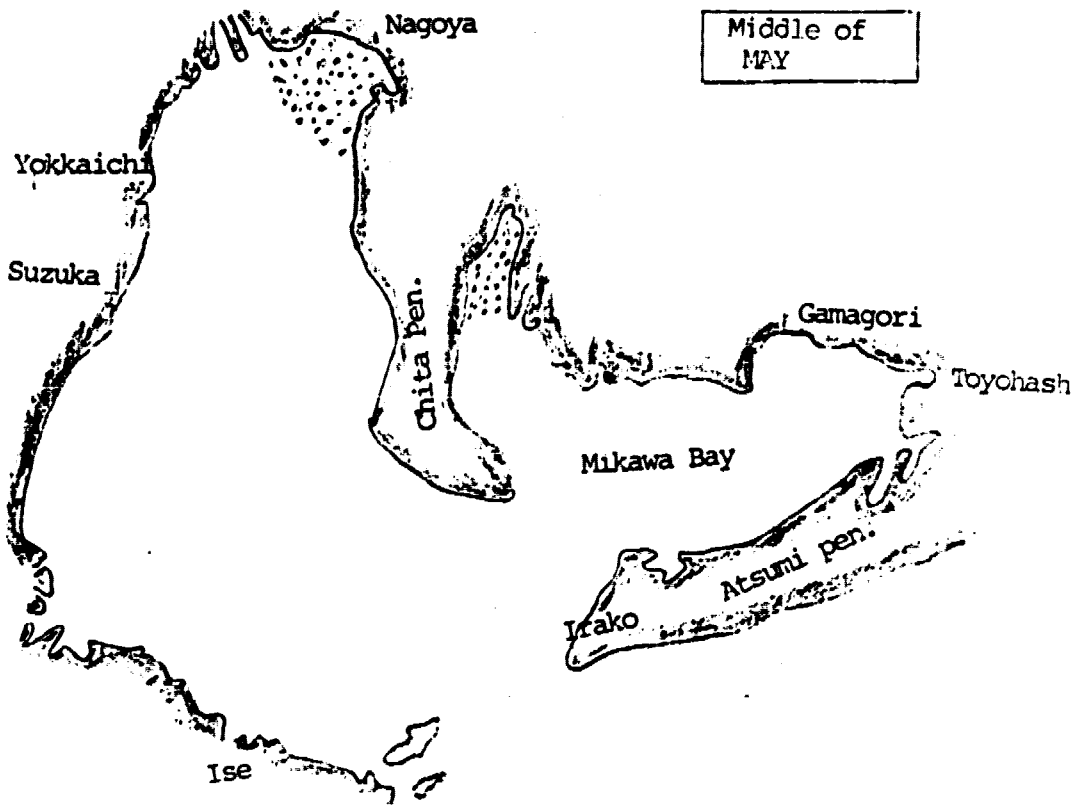
DISRIBUTION OF FREQUENCY OF RED TIDE

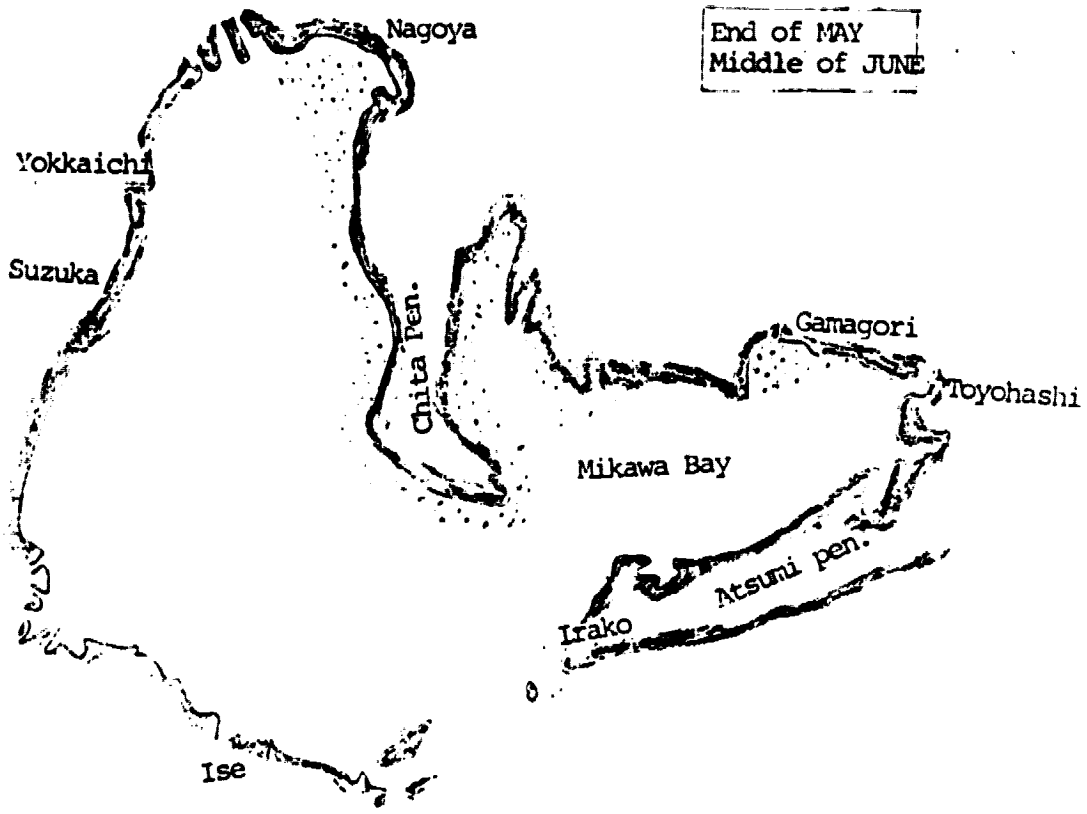
1972.3.18-11.20.

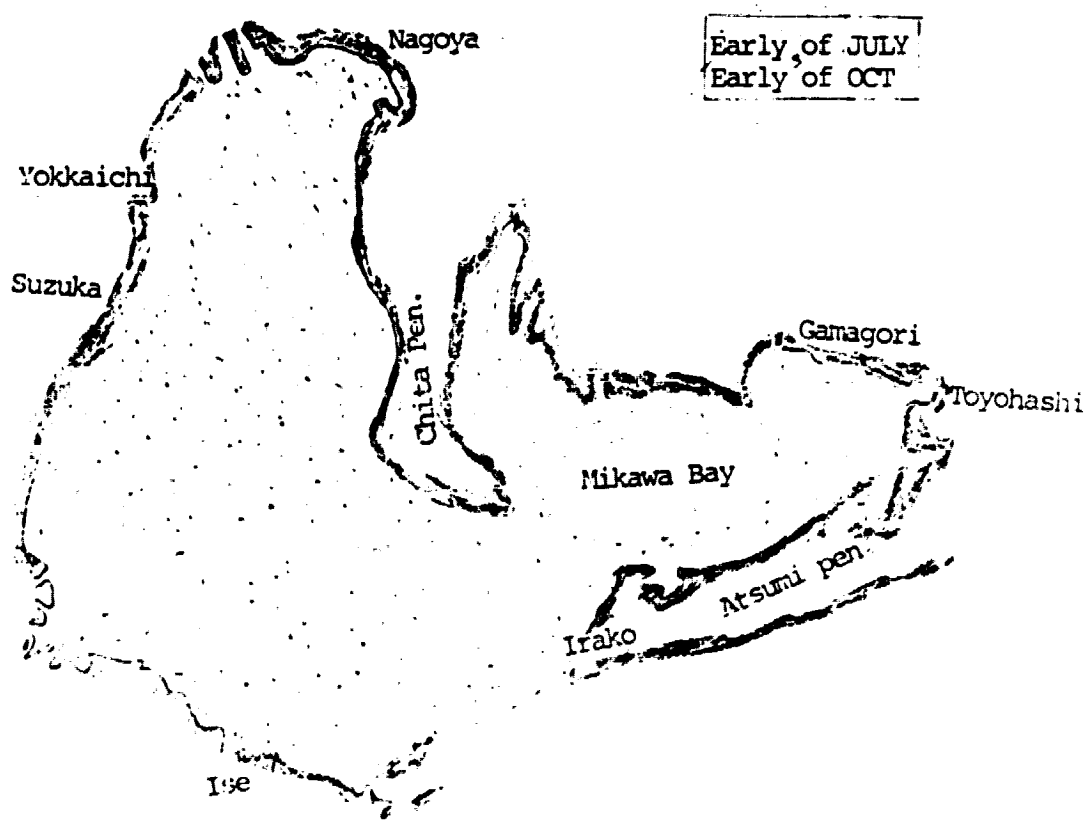


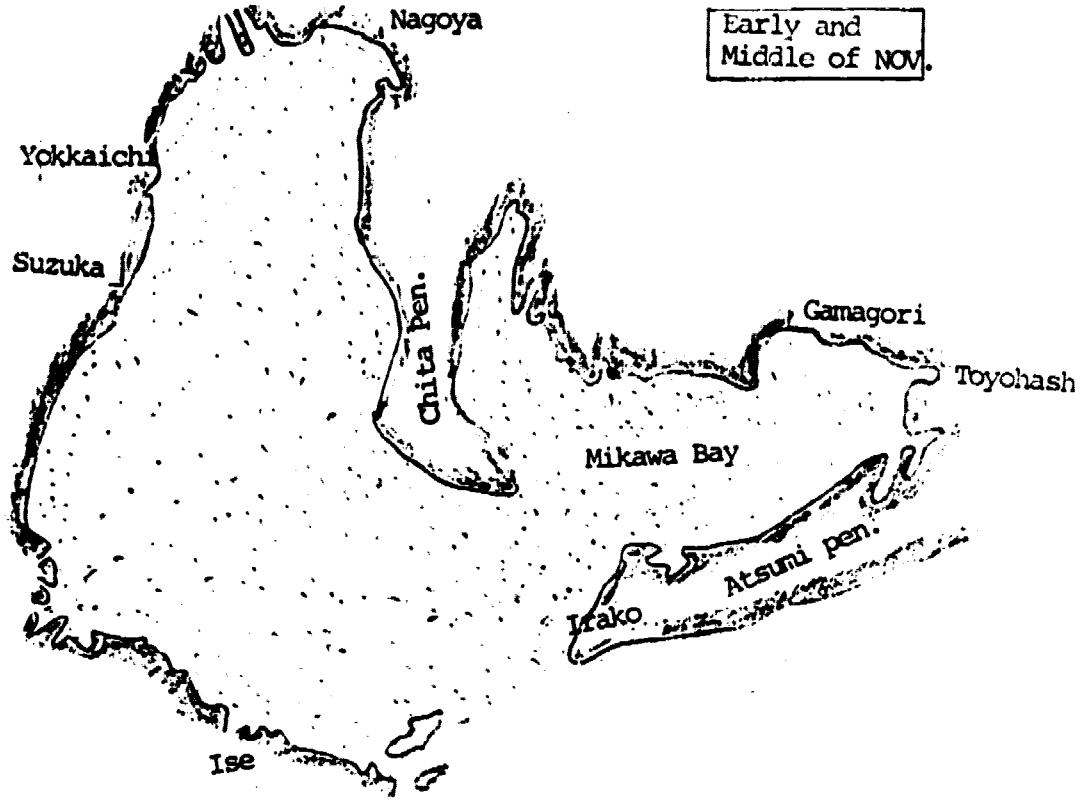
DISTRIBUTION OF RED TIDE IN ISE BAY (1972)

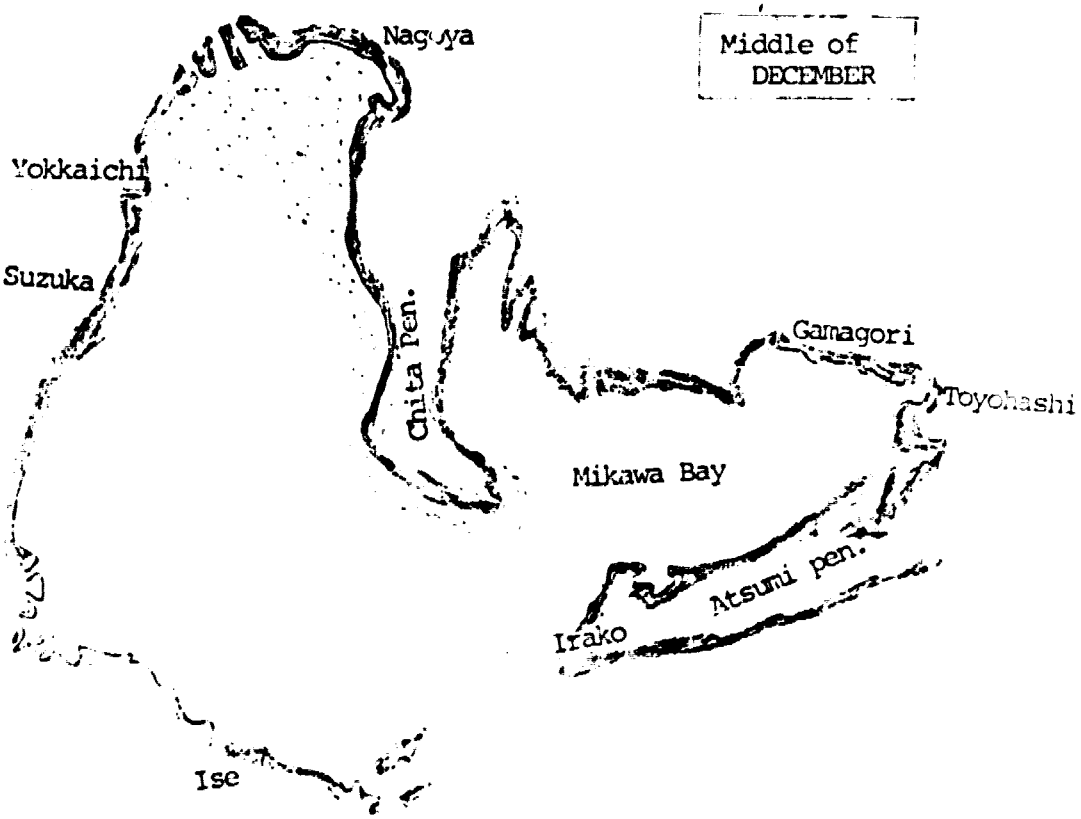





End of MAY
Middle of JUNE
Nagoya
Yokkaichi
Suzuka
Chita Pen.
Gamagori
Toyohashi
Mikawa Bay
Atsumi pen.
Irako
Ise


Early of JULY
Early of OCT
Nagoya
Yokkaichi
Suzuka
Chita Pen.
Gamagori
Toyohashi
Mikawa Bay
Atsumi pen.
Irako
Ise


Early and
Middle of NOV.
Nagoya
Yokkaichi
Suzuka
Chita Pen.
Gamagori
Toyohash
Mikawa Bay
Atsumi pen.
Irako
Ise


Middle of
DECEMBER
Nagoya
Yokkaichi
Suzuka
Chita Pen.
Gamagori
Toyohashi
Mikawa Bay
Atsumi pen.
Irako
Ise