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RDC-3

Radioactivity Survey of the mid Pacific Area, 1962

III At the Tokyo Central (Tsukiji) Fish Market

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AUGUST 1963

Radiation Survey of Tuna Fish Obtained at the Tokyo Central Fish Market, During the Period, May to October, 1962.

*Toshiharu KAWABATA,
Toshiyuki MIURA
and
Katsuko SHIMANUKI

*Department of Food Control, National Institute of Health

Duration of Sampling: From May 2, 1962 to October 31, 1962

Place of Sampling: Tokyo Central Fish Market, Tokyo
All of the samples were taken by the inspectors of the Tokyo Metropolitan Food Inspection office of Tokyo Central Wholesale Market.

Number of Samples:

Table 1. Eviscerated fish:*

	May	Jun	Jul	Aug	Sep	Oct	Total
Big eye tuna	16	55	44	56	46	13	230
Yellow fin tuna	4	5	28	54	51	66	208
Sword fish		2	6				8
Total	20	62	78	110	97	79	446

Each fish was separated into 4 samples sections consisting of the skin, bone, light muscle and dark muscle. Therefore, the total number of samples requiring analysis was 1,784.
Note: *Tuna fish are usually eviscerated aboard the fishing boat immediately after being caught.

Table 2. Whole fish:

	Mat	Jun	Jul	Aug	Sep	Oct	Total
Big eye tuna			2				2
Yellow fin tuna			2				2
Skipjack		1	4	1	1		7
Great barracuda		1					1
Total		2	8	1	1		12

Each whole fish was separated into the following sample sections: gill, bone, skin including scales, light muscle, dark muscle, liver, spleen, heart, pyloric caeca, stomach, stomach contents, intestine, intestinal contents, gonad and kidney.

Location of Fishing Boats

Locations of the fishing boats were based on the date the fish landed at the Tokyo Central Fish Market. Results are shown in Figures 1 to 7.

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Fig. 1. Location of fishing boats with catches landed during May, 1962.

Fig. 2. Location of fishing boats with catches landed during June, 1962.

Fig. 3. Location of fishing boats with catches landed during July, 1962.

Fig. 4. Location of fishing boats with catches landed during August, 1962.

Fig. 5. Location of fishing boats with catches landed during September, 1962.

Fig. 6. Location of fishing boats with catches landed during October, 1962.

Fig. 7. Summarized data on the distribution of fishing boats with catches landed at the Tokyo Central Fish Market during the period May to October 1962.

Key to location where species were caught.

x.....Big eye tuna (*Parathunnus mebachi*)

o.....Yellow fin tuna (*Neothunnus macropterus*)

△.....Sword fish (*striped marline*)(*Kajikia Mitsukurii*)

□.....Skipjack (*Katsuwonus pelamis*)

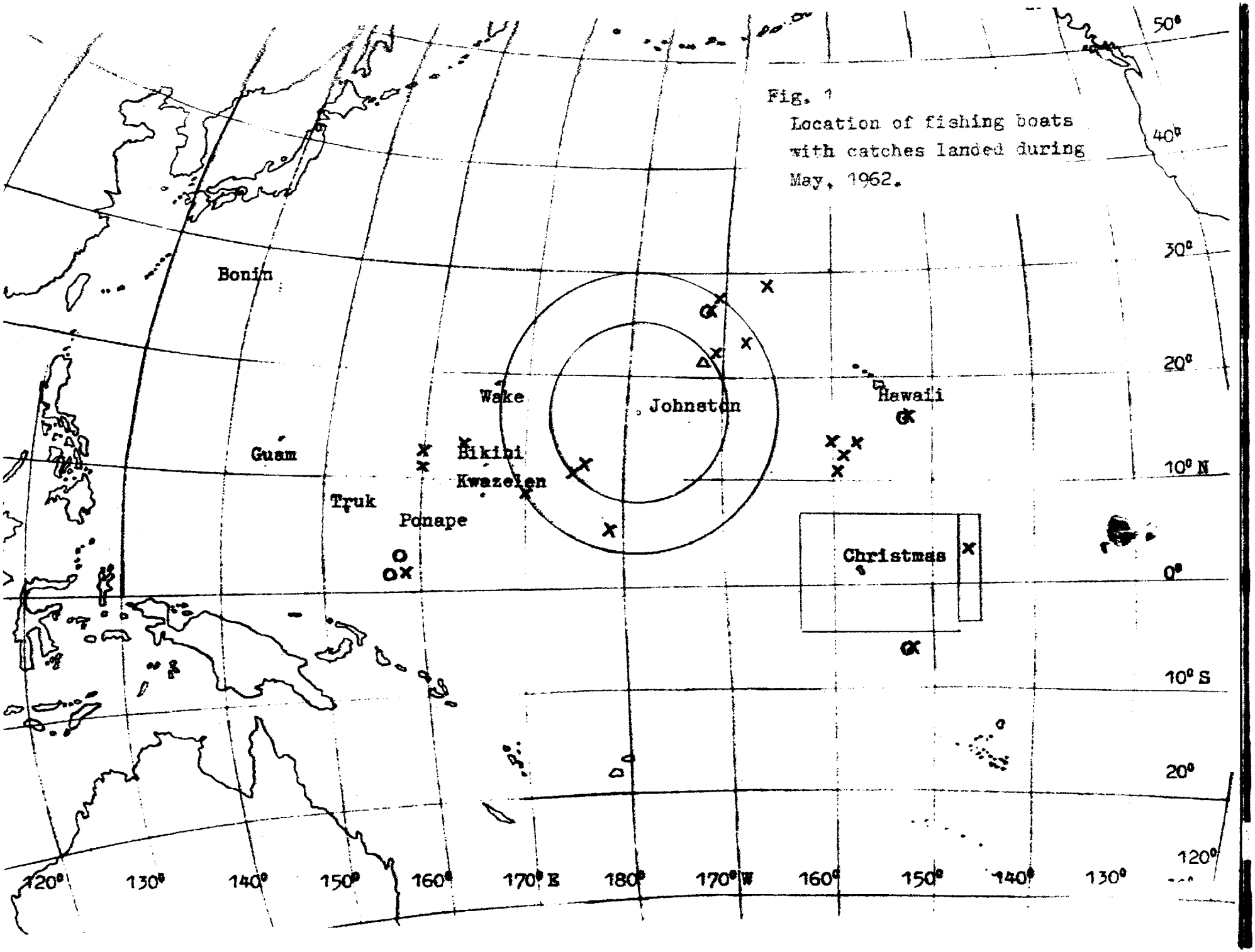

Fig. 1
Location of fishing boats with catches landed during May, 1962.

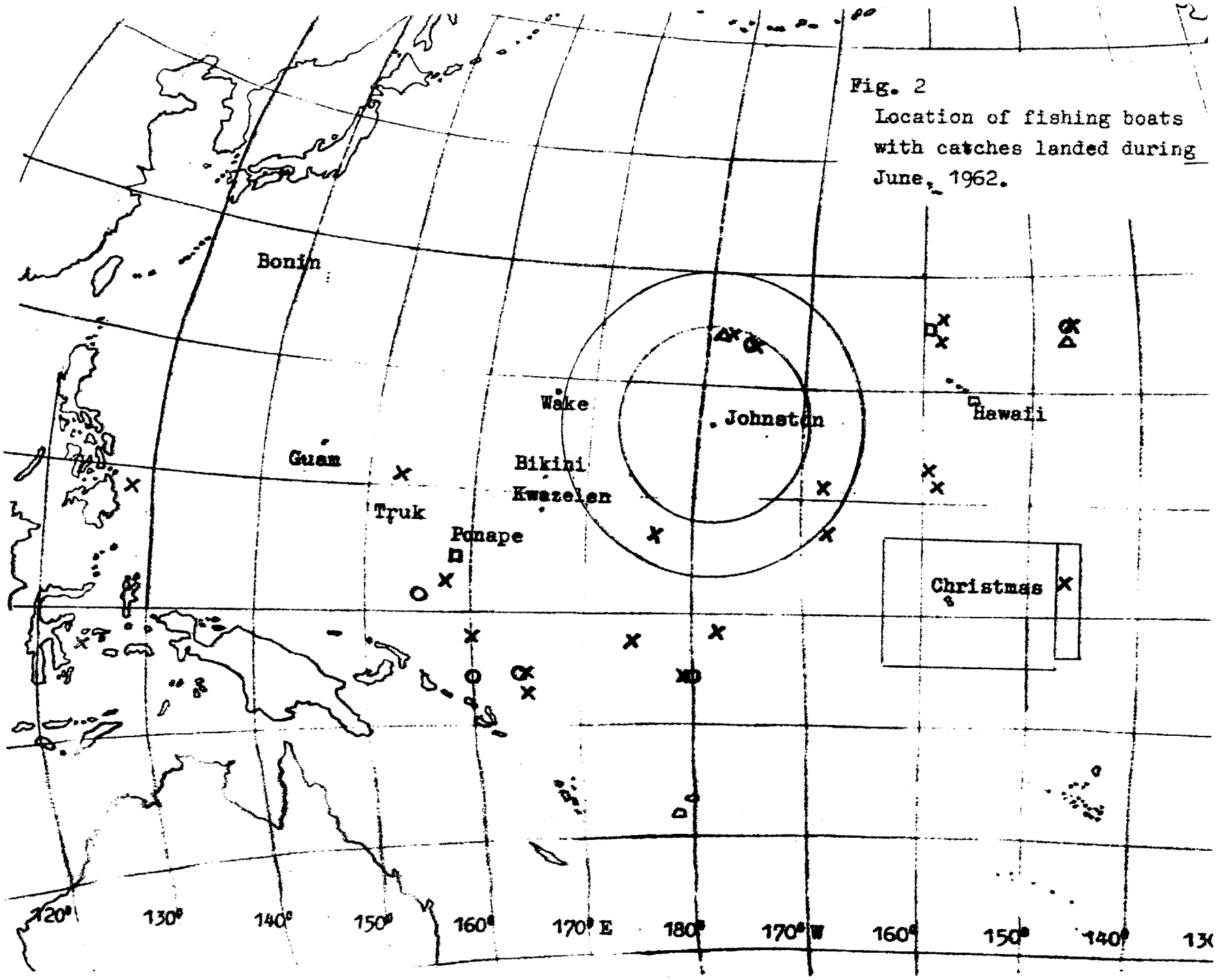

Fig. 2
Location of fishing boats with catches landed during June, 1962.

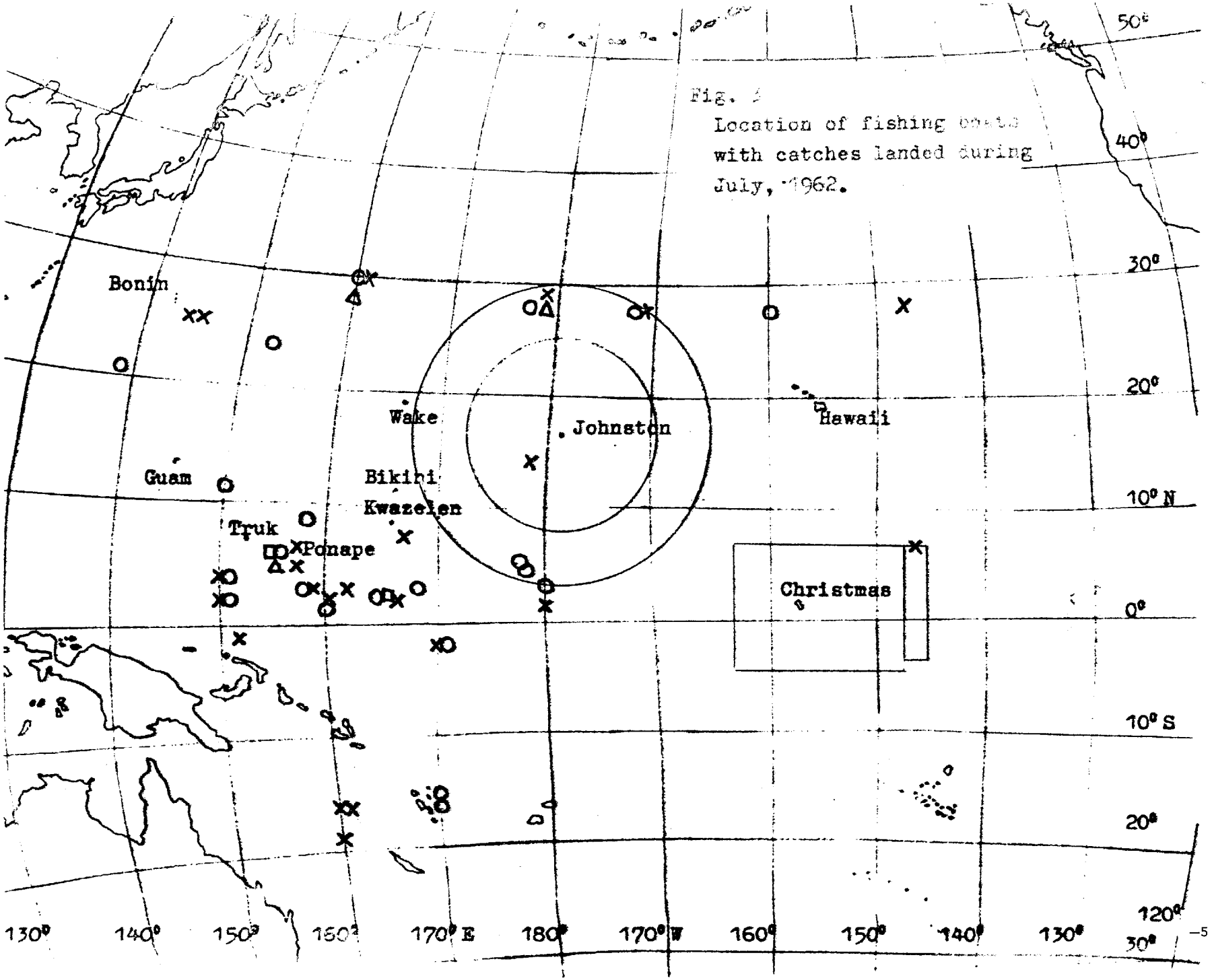

Fig. 5
Location of fishing boats with catches landed during July, 1962.

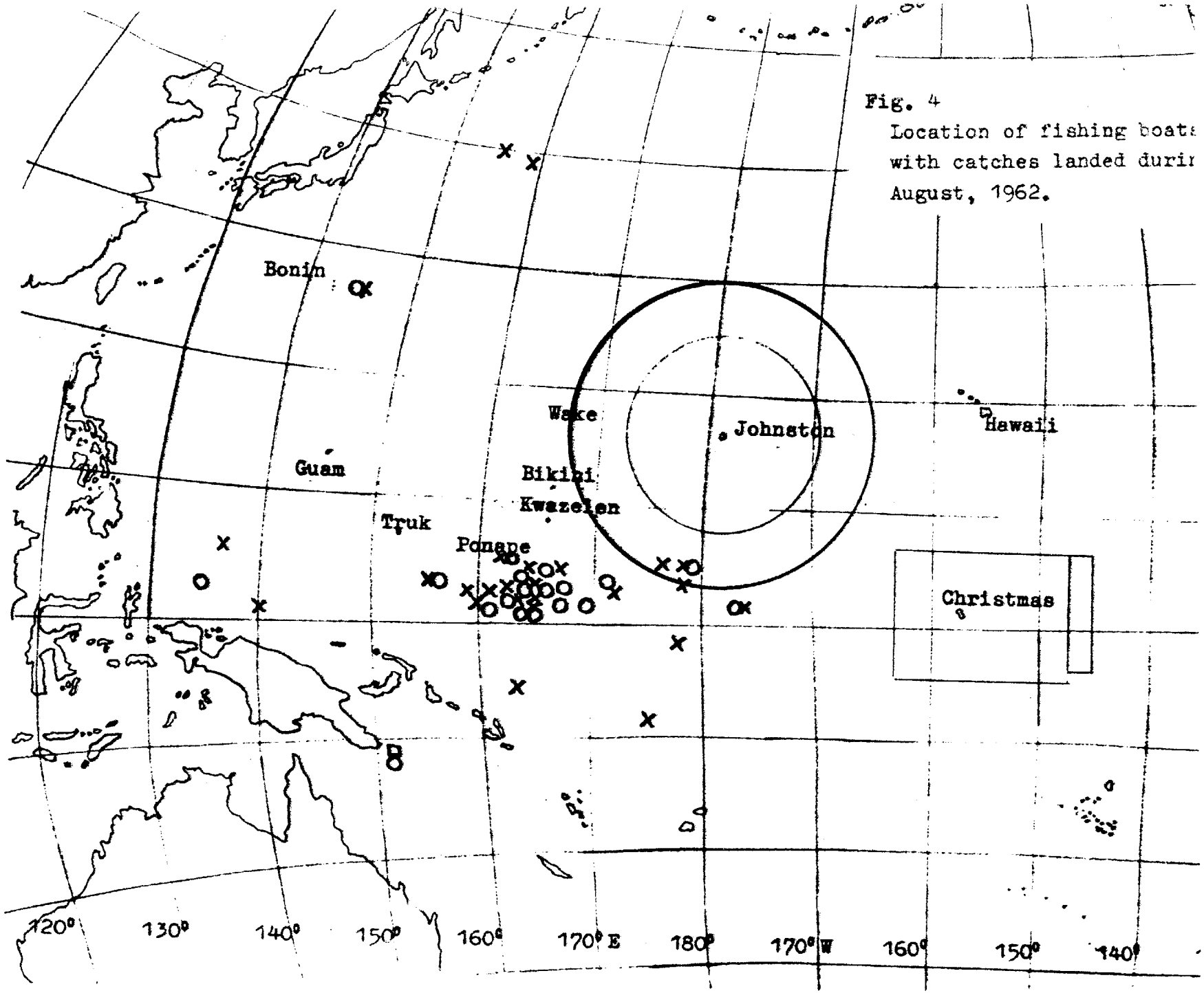

Fig. 4
Location of fishing boat
with catches landed durin
August, 1962.

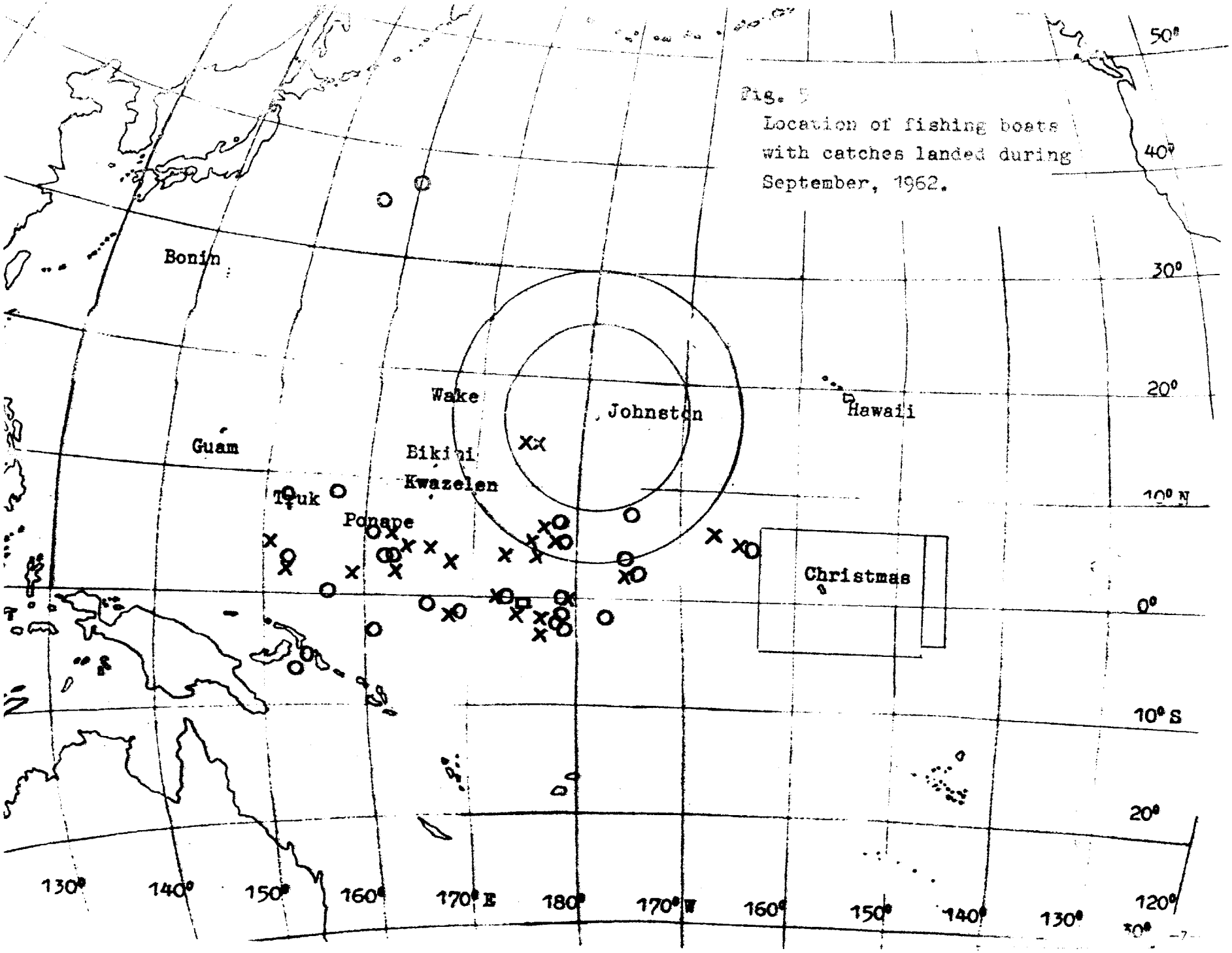

Fig. 5
Location of fishing boats with catches landed during September, 1962.

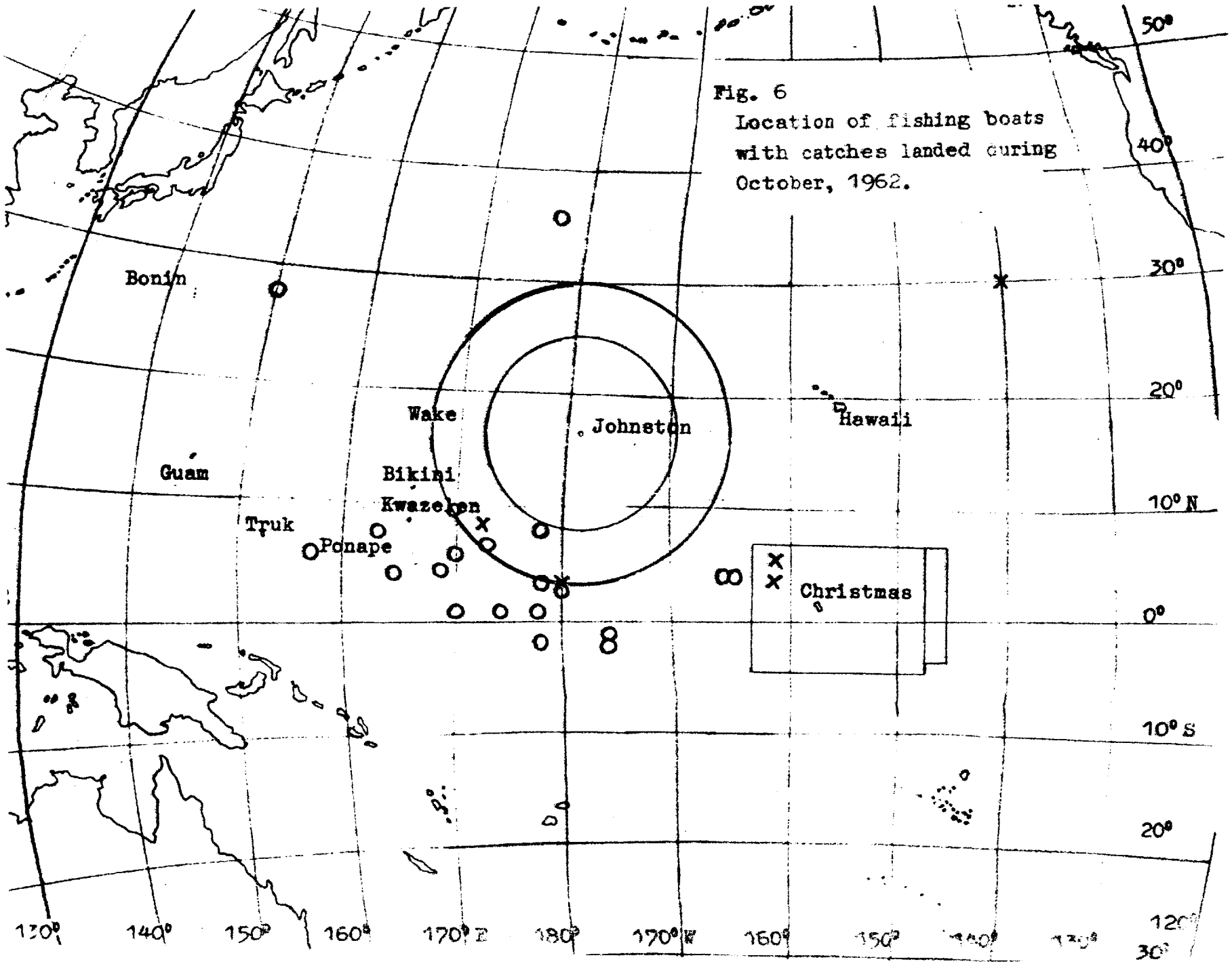

Fig. 6
Location of fishing boats with catches landed during October, 1962.

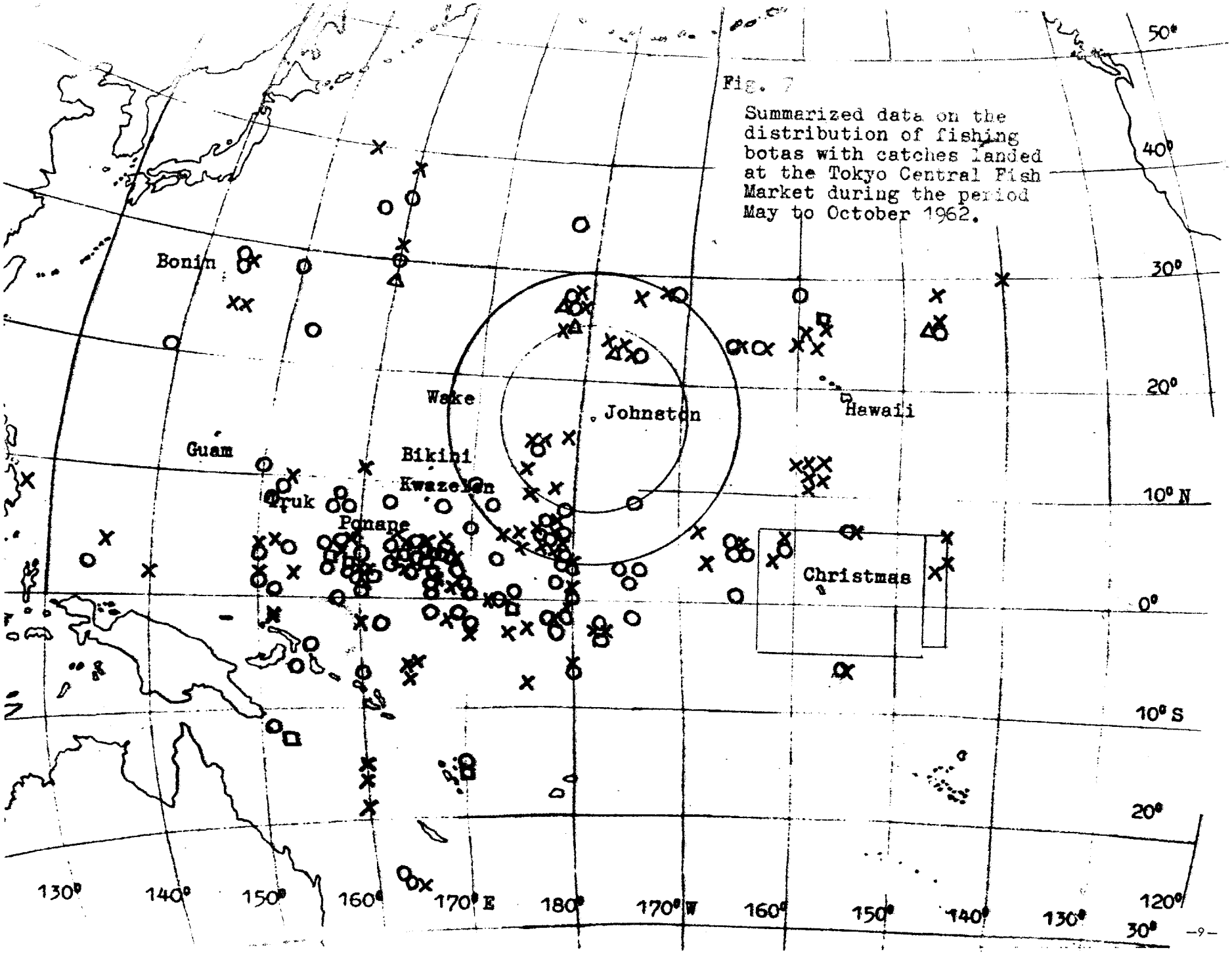

Fig. 7

Summarized data on the distribution of fishing botas with catches landed at the Tokyo Central Fish Market during the period May to October 1962.

Methods and Conditions for the Determination of

Radioactivity in the Fish Samples:

1. Preparation of Samples:
   One g of each sample was minced and placed in a 25 mm x 6 mm, 5 cm^2 stainless-steel planchet, then dried thoroughly under a heat lamp.

2. Gross β-activity:
   Detector: 1.4 mg/cm^2 end-window type, G-M counter. Distance from the planchet to the window= 1.0 cm. Efficiency of the counter= 20.2 % (against U_3O_8 standard).
   Scaler: ALOKA DC-5 with an automatic sample changer and recorder.
   Determination: Preliminary determination of the β-activity of all samples was set at 200 counts. When the counting rate of a sample exceeded the background at the 95% confidence level, re-dtermination of the β-activity was conducted at a counting time of 60 minutes.

3. Gross γ-activity:
   Detector: 1" x 1" NaI crystal scintillation counter, with type ND-10 probe. Distance from the planchet to the crystal = 1.0 cm. Efficiency of the counter=7.0 % (against U_3O_8 standard).
   Scaler: An ALOKA DC-5 with an automatic sample changer and recorder.
   Determination: Preliminary measurements of the γ-activity of all samples was set at 1,000 counts. When the counting rate of a sample exceeded the background at the 95% confidence level, redetermination of activity was conducted at a total of 4,000 counts.

4. Expression of results (average values, Table 3):
   Results are shown in cpm of the dried sample from 1 g of the wet sample, at the 95% confidence level.

Table 3. Radioactivity Detected in Samples of Eviscerated Fish

Month	Species	Amount	Sample type	Gross β-activity (cpm) Average value	No. found positive (activity)[2]	Gross γ-activity (cpm) Average value	No. found positive (activity)[3]
May	Big eye tuna	16	B.	1.3±2.1	0	4.0±7.8	0
			S.	0.8±2.1	0	0 ±7.6	0
			L.M.	1.2±2.2	0	4.0±7.8	0
			D.M.	0.8±2.1	0	5.0±7.8	0
	Yellow fin tuna	4	B.	1.5±2.2	0	0 ±8.5	0
			S.	1.7±2.3	0	-5.0±9.5	0
			L.M.	1.5±2.2	1(1.3+1.2)	0 ±8.5	0
			D.M.	0.7±2.1	0	2.0±7.7	0
June	Big eye tuna	55	B.	0.9±2.1	0	2.0±7.7	0
			S.	-0.6±2.2	0	5.0±7.8	0
			L.M.	1.8±2.3	0	4.0±7.8	0
			D.M.	1.8±2.3	0	4.0±7.8	0
	Yellow fin tuna	5	B.	1.5±2.7	0	0 ±7.7	0
			S.	-0.3±2.5	0	6.0±7.6	0
			L.M.	-0.3±2.5	0	-1.0±7.6	0
			D.M.	1.1±2.5	0	1.0±7.8	0
	Striped marlin	2	B.	0.4±2.3	0	5.0±7.8	0
			S.	1.6±2.4	0	1.0±8.0	0
			L.M.	0.7±2.1	0	3.0±7.8	0
			D.M.	0.1±2.3	0	-1.0±7.8	0

Month	Species	Amount	Sample type	Gross activity (cpm) Average value	No. found positive (activity)[2]	Gross activity (cpm) Average value	No. found positive (activity)[3]
	Big eye tuna	44	B.	0.2±2.3	0	-4.0±8.0	0
			S.	0.2±2.3	0	-4.0±8.0	0

			[illegible]	1.8±2.3	0	[illegible]	0
			D.M.	1.8±2.3	0	4.0±7.8	0
June						4.0±7.8	0
	Yellow fin tuna	5	B.	1.5±2.7	0	0 ±7.7	0
			S.	-0.3±2.5	0	6.0±7.6	0
			L.M.	-0.3±2.5	0	-1.0±7.6	0
			D.M.	1.1±2.5	0	1.0±7.8	0
	Striped marlin	2	B.	0.4±2.3	0	5.0±7.8	0
			S.	1.6±2.4	0	1.0±8.0	0
			L.M.	0.7±2.1	0	3.0±7.8	0
			D.M.	0.1±2.3	0	-1.0±7.8	0

Month	Species	Amount	Sample type	Gross activity (cpm) Average value	No. found positive (activity)[2]	Gross activity (cpm) Average value	No. found positive (activity)[3]
	Big eye tuna	44	B.	0.2±2.3	0	-4.0±8.0	0
			S.	0.2±2.3	0	-4.0±8.0	0
			L.M.	-0.1±2.4	0	0 ±7.7	0
			D.M.	-0.8±2.3	0	0 ±7.7	0
Jul							
	Yellow fin tuna	28	B.	0 ±2.3	0	-6.0±7.5	0
			S.	0.1±2.4	0	-3.0±7.6	0
			L.M.	0.6±2.5	0	-2.0±7.8	0
			D.M.	1.4±2.5	0	-5.0±7.5	0
	Striped marlin	6	B.	0.8±2.4	0	-6.0±7.5	0
			S.	0.4±2.3	0	-3.0±7.6	0
			L.M.	0.5±2.3	0	-4.0±8.0	0
			D.M.	0.5±2.3	0	-1.0±7.6	0
	Big eye tuna	56	B.	0.4±2.4	0	4.0±7.5	0
			S.	0.5±2.4	0	3.0±7.7	0
			L.M.	0.7±2.2	0	2.0±7.9	0
			D.M.	0.8±2.2	0	2.0±7.9	0
Aug							
	Yellow fin tuna	54	B.	0.5±2.2	0	-1.0±8.0	0
			S.	0.1±2.3	0	1.0±7.6	0
			L.M.	0.8±2.2	0	3.0±7.7	0
			D.M.	1.6±2.3	0	4.0±7.5	0

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Sep	Big eye tuna	46	B.	-0.2±2.7	0	-2.0±7.8	0
			S.	-0.1±2.4	0	1.0±7.5	0
			L.M.	-0.3±2.7	0	3.0±7.8	0
			D.M.	0.4±2.9	0	1.0±7.5	0
	Yellow fin tuna	51	B.	-0.5±2.4	0	0 ±7.9	0
			S.	-0.1±2.5	0	3.0±7.8	0
			L.M.	-0.1±2.5	0	1.0±7.5	0
			D.M.	-0.1±2.4	2(1.7+1.2)	2.0±7.6	0
Oct	Big eye tuna	13	B.	0.8±2.4	0	1.0±7.5	0
			S.	1.3±2.5	0	2.0±7.8	0
			L.M.	0.8±2.4	0	3.0±7.8	0
			D.M.	0.9±2.4	0	1.0±7.7	0
	Yellow fin tuna	66	B.	1.8±2.5	0	2.0±7.4	0
			S.	1.5±2.5	1(1.4+1.2)	2.0±7.4	0
			L.M.	1.1±2.3	2(1.6+1.3)	3.0±7.5	0
			D.M.	0.6±2.4	1(1.6+1.2)	1.0±7.4	0
	Total	446	784		7(max.cpm 1.7+1.2)		

NOTES: 1. Key to sample type: B-bone; S-skin to include scales; L.M-light muscle D.M.- dark muscle.
2. Samples with gross activity higher than background.
3. Samples with gross activity higher than background.

Table 4 Gross β and γ Activities in the Various Sample sections of Whole Fish

Fish No:	M-1		M-2		M - 3		M - 4		M - 5	
Date received:	May 23, 1962		June 12, 1962		June 27, 1962		June 27, 1962		June 27, 1962	
Fish Name:	Great barracuda		Skipjack		Yellow fin tuna		Skipjack		Yellow fin tuna	
Name of boat:	Maruni Maru		Koho Maru, #8		Seio Maru, #1		Jyu-jyu Maru, #3		Fukuju Maru, # 11	
Date of caught:	Apr. 2-May 2,'62		Apr. 20-May 21, '62		May 15-June 10,162		May 13-June 15,'62		May 20-June 15, '62	
Location of caught:	N 3-6°;E 155-162°		N 24-27°;W 157-160°		S 1-10°; E 160-169°		N 5°; E 158°		N 2-3°;E 154-158°	
	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ
Bone	2.0±2.5	1.0±7.7	0.9±1.4	0.8±3.8	-1.0±2.7	-1.0±7.7	0.8±2.6	7.0±7.7	-0.6±2.5	4.0±7.4
Skin (with scales)	-1.1±2.2	1.0±7.7	0±1.4	0.4±3.8	-1.0±2.7	-1.0±7.7	-0.8±2.4	-3.0±7.6	-0.9±2.5	3.0±7.4
Light muscle	1.3±2.4	1.0±7.0	0.6±1.4	1.6±3.8	1.1±2.9	0±7.7	-0.4±2.5	1.0±7.7	1.5±2.7	1.0±7.3
Dark muscle	1.0±2.4	-2.0±7.6	0.4±1.4	0.8±3.8	-0.2±2.7	-1.0±7.7	-0.4±2.5	2.0±7.8	0±2.5	0±7.3
Gill	0.5±2.3	2.0±7.7	0.7±1.4	1.8±3.8	0.3±2.8	1.0±7.7	1.4±2.7	4.0±7.8	-1.5±2.4	1.0±7.3
Liver	0.1±2.3	6.0±7.7	0.3±1.4	0±3.8	2.4±2.9	-5.0±7.5	1.3±2.7	-2.0±7.6	-0.7±2.5	5.0±7.5
Spleen	1.6±2.5	-1.0±7.7	1.0±1.4	2.2±3.9	0.8±2.8	1.0±7.7	1.6±2.7	1.0±7.7	2.2±1.4*	1.9±3.9**
Heart			-0.4±1.3	0±3.8	0.4±2.5	-1.0±7.7	0.4±2.6	7.0±7.7	1.0±2.6	-2.0±7.2
Pyloric caeca	0.9±2.4	-4.0±7.5	1.6±1.4	0.7±3.8	0.6±2.5	-1.0±7.7	0.3±2.6	7.0±7.7	0.3±2.5	5.0±7.5
Stomach			0.8±1.4	0±3.8	0.5±2.5	-4.0±7.5	0.2±1.4*	0.1±3.8**	0.2±1.4*	2.2±3.9**
Stomach contents					-0.1±2.4	-4.0±7.5	0.8±2.6	6.0±7.7	0.5±1.4*	-0.2±3.8**
Intestine	2.6±2.5	0±7.7	-0.2±1.3	2.6±3.9	2.1±2.6	6.0±7.7	1.1±2.6	4.0±7.8	1.0±1.4	3.4±3.9
Intestic contents							2.5±2.8	-1.0±7.7		
Gonad	0.7±2.3	0±7.7	-0.5±1.3	2.4±3.9			1.1±2.6*	3.0±7.8**		
Kidney	1.0±2.4	0±7.7	0.7±1.4	1.4±3.8	1.8±2.6	-1.0+7.7	1.2±1.4	1.8±3.8	1.1±2.7	0±7.3

M - 5 June 27, 1962 Yellow fin tuna Fukuju Maru, # 11 May 20-June 15, '62 N 2-3°;E 154-158°		M - 6 June 29, 1962 Big eye tuna Sachi Maru, #1 May 28-June 22, '62 S 1-3°: E 160°		M - 7 July 3, 1962 Big eye tuna Kidai Maru June 1-June 24,'62 N 5°;E 150°		M - 8 July 8, 1962 Skipjack Nanshin Maru, #11 May 30-June 26,'62 N 4-7°; E 155-157°		M - 9 July 19, 1962 Skipjack Sho-un Maru, #18 June 20-July 4,'62 N 3-4°; E 165°		M - 10 July 24, 1962 Skipjack Koryo Maru, #6 June 9-July 9, '62 S 15°; E 170°		Au Sk His June S 1
gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ	gros
-0.6±2.5	4.0±7.4	1.5+2.7	3.0+7.4	-0.5+2.5	6.0+7.5	1.5+2.5	-2.0+8.3	0.2±2.3	2.0±7.9	1.0±2.4	3.0±7.9	-0.6
-0.9±2.5	3.0±7.4	1.3+2.7	3.0+7.4	0.3+2.5	5.0+7.5	-0.2+2.4	-5.0+8.2	0.3±2.3	-4.0±7.9	-0.5±1.3*	0.4±3.8**	1.2
1.5±2.7	1.0±7.3	0.8+2.6	6.0+7.5	-0.6+2.5	3.0+7.4	0.4+2.4	-7.0+8.1	1.4±2.4	0±7.9	1.9±2.5	1.0±7.9	1.5
0±2.5	0±7.3	1.5+2.7	6.0+7.5	-0.7+2.5	5.0+7.5	0+2.4	-6.0+8.2	0.9±2.4	1.0±7.9	0.9±2.4	-2.0±8.0	0.7
-1.5±2.4	1.0±7.3	0.7+2.5	5.0+7.5	0.4+1.4*	-0.2+3.8**	-0.9+2.3	-6.0+8.1	1.4±2.4	1.0±7.9	-0.2±2.3	-2.0±8.0	1.6
-0.7±2.5	5.0±7.5	0+2.5	4.0+7.4	1.1+1.4*	2.8+3.9**	0.8+2.5	-2.0+8.3	1.3±2.4	2.0±7.9	0.6±2.3	4.0±7.8	0.9
2.2±1.4*	1.9±3.9**	0.8+2.6	5.0+7.5	3.3+1.5*	3.4+3.9**	1.4+2.5	-10.0+8.0	3.2±2.6	-3.0±8.0			0.7
1.0±2.6	-2.0±7.2	-1.3+2.4	6.0+7.5	0.9+1.4*	0.4+3.8**	0+2.5	-4.0+8.2	2.4±2.6	6.0±7.8	2.3±2.5	2.0±7.9	1.3
0.3±2.5	5.0±7.5	-0.3+1.3*	-0.4+3.8**	0.7+1.4*	1.6+3.8**	1.2+2.5	-6.0+8.1	2.2±2.5	-4.0±7.9	2.1±2.5	-1.0±8.0	2.2
0.2±1.4*	2.2±3.9**	-0.1+2.5	2.0+7.4	0.9+2.6	5.0+7.5	-0.3+2.4	-9.0+8.1	0.8±2.4	0±2.4	2.4±2.5	1.0±7.9	0.8
0.5±1.4*	-0.2±3.8**					-0.1+2.4	-8.0+8.1	0.9±2.4	-3.0±8.0	2.2±2.5	1.0±7.9	
1.0±1.4	3.4±3.9	-0.6+2.5	3.0+7.4	1.7+2.7	1.0+7.3	1.4+2.5	-8.0+8.1	1.5±2.5	2.0±7.9	1.7±2.5	2.0±7.9	1.5
								2.7±2.6	4.0±7.9	1.8±2.5	0±7.9	0.5
						0.4+2.4	-4.0+8.2	0.3±2.4	5.0±7.8			0.1
1.1±2.7	0±7.3	0.1+1.4	0.4+3.8	0.2+1.4	1.5+3.8	1.0+2.5	-7.0+8.1	0.9±2.4	3.0±7.8	0.4±2.3	6.0±7.8	1.4

Results are shown in cpm of dried materia
of the wet sample
* 60 minute determination used
** 4,000

	M - 7 July 3, 1962 Big eye tuna Kidai Maru June 1-June 24,'62 N 5°;E 150°		M - 8 July 8, 1962 Skipjack Nanshin Maru, #11 May 30-June 26,'62 N 4-7°; E 155-157°		M - 9 July 19, 1962 Skipjack Sho-un Maru, #18 June 20-July 4,'62 N 3-4°; E 165°		M - 10 July 24, 1962 Skipjack Koryo Maru, #6 June 9-July 9, '62 S 15°; E 170°		M - 11 August 8, 1962 Skipjack Hisaho Maru, # 2 June 22-July 25, '6 S 12°; E 151°		M - 12 September 14, 1962 Skipjack Seifuku Maru, # 8 July 25-Sept. 1,'62 S 1°; E 175°	
'62	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ	gross β	gross γ
4	-0.5+2.5	6.0+7.5	1.5+2.5	-2.0+8.3	0.2±2.3	2.0±7.9	1.0±2.4	3.0±7.9	-0.6±2.1	-6.0±7.2	1.6±3.0	-1.0±7.5
4	0.3+2.5	5.0+7.5	-0.2+2.4	-5.0+8.2	0.3±2.3	-4.0±7.9	* -0.5±1.3	** 0.4±3.8	1.2±2.3	-2.0±7.3	-0.2±2.8	2.0±7.6
5	-0.6+2.5	3.0+7.4	0.4+2.4	-7.0+8.1	1.4±2.4	0±7.9	1.9±2.5	1.0±7.9	1.5±2.3	4.0±7.7	0±2.8	-8.0±7.5
5	-0.7+2.5	5.0+7.5	0+2.4	-6.0+8.2	0.9±2.4	1.0±7.9	0.9±2.4	-2.0±8.0	0.7±2.2	5.0±7.7	0.6±2.9	-8.0±7.5
5	* 0.4+1.4	** -0.2+3.8	-0.9+2.3	-6.0+8.1	1.4±2.4	1.0±7.9	-0.2±2.3	-2.0±8.0	1.6±2.3	-2.0±7.3		
4	* 1.1+1.4	** 2.8+3.9	0.8+2.5	-2.0+8.3	1.3±2.4	2.0±7.9	0.6±2.3	4.0±7.8	0.9±2.2	3.0±7.6	-0.7±2.8	2.0±7.9
5	* 3.3+1.5	** 3.4+3.9	1.4+2.5	-10.0+8.0	3.2±2.6	-3.0±8.0			0.7±2.2	-3.0±7.3		
5	* 0.9+1.4	** 0.4+3.8	0+2.5	-4.0+8.2	2.4±2.6	6.0±7.8	2.3±2.5	2.0±7.9	1.3±2.3	-1.0±7.4	-0.6±2.8	-3.0±7.7
*	* 0.7+1.4	** 1.6+3.8	1.2+2.5	-6.0+8.1	2.2±2.5	-4.0±7.9	2.1±2.5	-1.0±8.0	2.2±2.4	3.0±7.6	-0.5±2.8	-1.0±7.8
.	0.9+2.6	5.0+7.5	-0.3+2.4	-9.0+8.1	0.8±2.4	0±2.4	2.4±2.5	1.0±7.9	0.8±2.2	1.0±7.5		
			-0.1+2.4	-8.0+8.1	0.9±2.4	-3.0±8.0	2.2±2.5	1.0±7.9				
.	1.7+2.7	1.0+7.3	1.4+2.5	-8.0+8.1	1.5±2.5	2.0±7.9	1.7±2.5	2.0±7.9	1.5±2.3	-1.0±7.4	-0.2±2.8	-4.0±7.6
					2.7±2.6	4.0±7.9	1.8±2.5	0±7.9	0.5±2.2	4.0±7.7	2.1±3.0	-1.0±7.8
			0.4+2.4	-4.0+8.2	0.3±2.4	5.0±7.8			0.1±2.2	3.0±7.6		
	0.2+1.4	1.5+3.8	1.0+2.5	-7.0+8.1	0.9±2.4	3.0±7.8	0.4±2.3	6.0±7.8	1.4±2.3	4.0±7.7	-0.2±2.8	-1.0 7.8

Results are shown in cpm of dried material from 1 g of the wet sample

* 60 minute determination used

** 4,000 count determination used.