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CATALOGUE OF YELLOWFIN TUNA LENGTH-WEIGHT DATA

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Working Paper for
Western Pacific Yellowfin Research Group
Meeting 3, Pohnpei
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Background

In 1992 we examined variation in length-weight relationships using data collected by Australian observers on Japanese longliners, 1980-91 (Ward & Ramirez 1992). These analyses showed that length-weight relationships of yellowfin tuna are quite variable. We found statistically significant differences in relationships for yellowfin tuna from different areas and seasons, and between males and females. Length-weight relationships may also vary from year-to-year and between fishing methods.

The 1992 analyses showed how these differences might cause significant errors in the catch-at-length tables derived from length-weight relationships, and then propagate into length- or age-based modelling that may use those tables. We concluded that functional length-weight relationships, derived from the population sampled, should be used for raising length samples.

The second meeting of the Western Pacific Yellowfin Research Group (WPYRG) decided that representative length-weight relationships were required for each month-area-fishing method stratum. The WPYRG recommended that a length-weight database be established to facilitate analysis of the effects of various factors on length-weight relationships.

Catalogue of Length-weight Data

In October 1992, WPYRG Chairman Dr Gary Sakagawa, wrote to WPYRG participants seeking information on yellowfin tuna length-weight data. The purpose of this request was not to assemble length-weight data at this stage, but to gather information on what data might be available: its quality, and coverage of geographical areas, seasons and fishing methods.

Responses to Dr Sakagawa's request (Table 1) indicate that length-weight data are available for at least 63 620 yellowfin tuna caught in the western Pacific (Table 2). In the 1950s and 1960s Japanese scientists published several analyses for yellowfin tuna caught by longline, e.g, Tester & Nakamura (1957), Kamimura & Honma (1959), Nakamura & Uchiyama (1959), Morita (1973) and Yoshida (1979). The original data from these studies are not, at present, available. Port samplers in Federated States of Micronesia, Palau and Marshall Islands have collected length-weight data from a remarkable 45 236 yellowfin tuna caught by longline. However, the WPYRG may need to examine the methods used to weigh these yellowfin tuna before we analyse these data.

Data are apparently rare and few analyses have been published for yellowfin tuna caught by surface methods, such as purse seine. However, the SPC, through the Regional Tuna Tagging Programme (RTTP) and its predecessor the Skipjack Stock Assessment Programme (SSAP) redressed this problem in the 1980s and early 1990s. The RTTP and SSAP gathered more than 7418 length-weight measurements for yellowfin tuna caught by pole-and-line over most WPTF areas in 1977-80 and 1989-92.

Table 1. Summary of responses to request for yellowfin tuna length-weight data.

Correspondent	Country	Organisation	Date	Comments
Bungitak	Marshall Islands	MIMRA	12/10/92	Routinely forwarded to SPC.
Sharma	Fiji	MPI	14/10/92	No data, but will commence port sampling.
Heberer	FSM	MMA	29/10/92	Good LL data from transshipments at Yap & Pohnpei, forwarded to SPC. Need to assess quality of Observer data. Has LW data from Ecuador.
Yen	French Polynesia	EVAAM	20/11/92	Completed catalogue for port sampling of LL catches (1991/92). Army may have other data for LL & TR during 1980s.
Craig	American Samoa	DMWR	10/11/92 2/12/92	Completed catalogue for port sampling of PS (1992) & provided hardcopy (150 fish).
Coan	US	NMFS	24/11/92	No data - contact Boggs (NMFS).
Sun	Taiwan	NTU	16/11/92	No data. Confirmed by Kou (TFRI).
Lawson		SPC	1/12/92	Completed catalogue for SSAP, RTTP & port sampling (FSM, Marshall Islands & Palau).
Diake	Solomon Islands	MNR	23/11/92	Routinely forwarded to SPC. Need to assess quality.
Etaix-Bonnin	New Caledonia	SDDAM	10/12/92	Completed catalogue for port sampling of RR, VL, LL, TR (1985-91). Also, contact ORSTOM.
Murray	New Zealand	MAF	30/12/92	Provided hard copy of 16 yellowfin tuna.
Ward	Australia	BRS	10/06/93	Completed catalogue for Australian observers on Japanese longliners (1980-93), observer trip on US purse seiner & landings.
Boggs	US	NMFS	02/06/93	
Ganaden	Philippines	BFA		Is checking.
Naamin	Indonesia	RIMFS		
Park	Korea	DSRD		
Rechebei	Palau	PMA		
Suzuki/Tsuji	Japan	NRIFSF	27/05/93	No data readily available.

Where To From Here?

Length-weight relationships might be used in processing data for WPYRG assessments: for converting weight frequencies to length frequencies and raising length samples to length frequencies for catch-at-length tables in stock assessment. Accurate estimates of total catch are available for several Western Pacific fisheries and length samples can be collected relatively easily. But, in many situations it is not possible to weigh the sample. Given a length-weight relationship and an estimate of total catch, however, a length sample can be raised to a length frequency for the total catch.

The WPYRG is reviewing approaches to stock assessment. The affect of variation in length-weight relationships used to process data for assessment might be investigated after we develop stock assessment models for yellowfin tuna. Ward *et al.*'s (1992) analyses, for example, showed that southern bluefin tuna length-weight relationships had varied over time. This had important implications for southern bluefin tuna stock assessments relying on length frequency estimates derived with length-weight relationships. Total removals from cohorts in age-structure models would be quite different, for example, according to which relationship was used to generate the length frequencies. The traditional relationships over-estimated the number of southern bluefin tuna that were 2 and 8-11 years, while underestimating those that were 4-6 years and 12-19 years.

In the meantime, WPYRG might consider how to promote continued collection of high-quality length and weight data. We should encourage measurement of yellowfin tuna by observers, port samplers and staff on research cruises. An integral part of this is instruction in correct measuring procedures, provision of suitable equipment (e.g., callipers, motion-compensated scales) and reporting of measuring methods. The quality of existing data must be closely investigated.

Another area of consideration is screening of data. We used a Chi-square test to determine whether the frequency of lengths and weights ending with '0' or '5' matched the expected frequencies, for example, to identify Australian observers who had measured to the nearer 5 cm or weighed to the nearer 5 kg. To remove obvious outliers we plotted weights against lengths, where available cross-checking suspect dressed weights against whole weights.

References

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Table 2. Catalogue of yellowfin tuna length-weight data.

Year	Month	WP Area	Method	No.	Size (cm)	Sex	Measuring Device	Weighing Device	Weight Type	Format	Source
1977	?	4	PL	140	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1977	?	6	PL	28	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1978	?	4	PL	557	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1978	?	5	PL	586	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1978	?	5	PL	174	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1978	?	6	PL	28	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1978	?	6	PL	88	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1978	?	7	PL	75	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1979	?	4	PL	1047	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1979	?	5	PL	21	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1979	?	6	PL	12	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1980	?	3	PL	753	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1980	?	4	PL	911	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1980	?	5	PL	241	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1980	?	6	PL	86	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1980	?	7	PL	8	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	SSAP (Lawson SPC)
1982	q3	4	LL	20	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1984	q3	4	LL	14	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1984	q3	4	LL	14	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1985	11	6	RR	1	?	no	?	?	Fresh whole weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1985	8	6	TR	24	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1985	9	6	TR	79	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1985	10	6	TR	84	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1985	11	6	TR	16	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1985	12	6	TR	25	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1986	3	6	TR	20	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1986	7	6	TR	4	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1986	8	6	TR	6	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1986	9	6	TR	17	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1986	12	6	TR	14	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	q3	4	LL	54	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1987	q4	4	LL	39	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1987	q3	4	LL	31	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1987	q4	4	LL	39	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)

Year	Month	WP Area	Method	No.	Size (cm)	Sex	Measuring Device	Weighing Device	Weight Type	Format	Source
1987	q4	6	LL	96	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1987	q4	6	LL	96	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1987	1	6	TR	12	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	2	6	TR	8	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	3	6	TR	6	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	6	6	TR	1	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	7	6	TR	12	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	8	6	TR	5	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	9	6	TR	54	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	10	6	TR	121	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	11	6	TR	3	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	12	6	TR	1	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1987	8	6	VL	2	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	q1	4	LL	104	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1988	q3	4	LL	99	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1988	q3	4	LL	119	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1988	10	6	LL	1	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	q2	6	LL	6	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1988	q2	6	LL	6	?	yes	tape (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1988	4	6	TR	1	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	5	6	TR	2	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	6	6	TR	14	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	7	6	TR	2	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	9	6	TR	1	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	10	6	TR	9	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	11	6	TR	8	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1988	12	6	TR	10	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1989	q1	4	LL	30	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1989	q3	4	LL	75	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1989	q1	4	LL	16	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1989	q3	4	LL	13	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1989	?	4	PL	3	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1989	q1	6	LL	42	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1989	2	6	RR	1	?	no	?	?	Fresh whole weight?	electronic ?	NC (Etaix-Bonnin MMPM)

Year	Month	WP Area	Method	No.	Size (cm)	Sex	Measuring Device	Weighing Device	Weight Type	Format	Source
1989	2	6	TR	3		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1989	11	6	TR	3		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1989	12	6	TR	3		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1980-90	?	5+	LL & TR	900		? yes	?	commercial scales (1 kg)	Frozen GG weight?	electronic ?	PF (Yen EVAAM)
1990	?	3	PL	29		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1990	q1	4	LL	54		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1990	q3	4	LL	488		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1990	q3	4	LL	75		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1990	?	4	PL	743		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1990	?	4	PL	690		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1990	8	6	LL?	15	117-130	yes	?	?	Frozen GG weight?	hard copy	NZ (Murray MAF)
1990	3	6	TR	2		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	4	6	TR	4		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	5	6	TR	1		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	6	6	TR	10		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	7	6	TR	2		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	11	6	TR	1		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	11	6	VL	1		? no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1990	?	3-	PL	25		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1990	?	3	1 PL	150		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1990	?	4	1 PL	22		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991	?	3	LL	296		? yes	?	?	Fresh GG weight?	electronic	PU (Lawson SPC)
1991	?	3	PL	20		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991	?	3	PL	102		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991	?	4	LL	2816		? yes	?	?	Fresh GG weight?	electronic	FM Port (Lawson SPC)
1991	4	4	LL	81		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1991	8	4	LL	596		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1991	9	4	LL	1195		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1991	4	4	LL	71		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1991	8	4	LL	447		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1991	9	4	LL	101		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1991	12	4	LL	114		? yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1991	?	4	PL	110		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991	?	4	PL	165		? yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)

Year	Month	WP Area	Method	No.	Size (cm)	Sex	Measuring Device	Weighing Device	Weight Type	Format	Source
1991	8	6	LL?	1	102	yes	?	?	Frozen GG weight?	hard copy	NZ (Murray MAF)
1991	3	6	TR	3	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1991	4	6	TR	21	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1991	5	6	TR	10	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1991	6	6	TR	11	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1991	10	6	TR	12	?	no	?	?	Frozen GG weight?	electronic ?	NC (Etaix-Bonnin MMPM)
1991	11	6	TR	4	?	no	?	?	Frozen GG weight?	electronic ?	NEC (Etaix-Bonnin ?)
1991	?	3-	PL	59	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991	?	3_1	PL	60	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991	?	4_1	PL	29	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1991/92	?	5	LL	416	?	no	?	commercial scales (1 kg)	Fresh GG weight?	electronic ?	PF (Yen EVAAM)
1992	?	3	LL	20697	?	yes	?	?	Fresh GG weight?	electronic	FM & PU (Lawson SPC)
1992	?	3	PL	98	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	4	LL	21195	?	yes	?	?	Fresh GG weight?	electronic	FM (Lawson SPC)
1992	1	4	LL	79	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	2	4	LL	389	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	3	4	LL	13	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	4	4	LL	79	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	7	4	LL	187	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	8	4	LL	818	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	9	4	LL	1502	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh GG weight	electronic	AU (Ward BRS)
1992	7	4	LL	11	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1992	8	4	LL	650	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1992	9	4	LL	222	?	yes	strip (1 cm)	boat's balance (1 kg)	Fresh whole weight	electronic	AU (Ward BRS)
1992	?	4	PL	91	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	9	4	PS	50	36-66	no	callipers (1 mm)	spring scales (0.1 lb)	Frozen GG weight?	hard copy	AS (Craig NMFS)
1992	9	4	PS	100	43-74	no	calipers (1 mm)	spring balance (0.1 lb)	Frozen whole weight	hardcopy	AS (Craig NMFS)
1992	?	5	PL	59	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	5	PL	18	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	6	PL	37	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	3-	PL	61	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	3-	PL	13	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	3_1	PL	37	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)
1992	?	3_1	PL	42	?	yes	board (1 cm?)	spring scales (0.1 kg ?)	Fresh whole weight	electronic	RTTP (Lawson SPC)

