
Seasonal Variations in Length, Weight and Condition Factor in *Katsuwonus pelamis* from the Coast of Karachi, Pakistan

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Abstract

The length, weight and condition factor data were recorded in (224) fishes of *Katsuwonus pelamis* in three different (pre-monsoon, monsoon, post-monsoon) seasons of the year (January 2011-December 2011) from the coast of Karachi. The highest mean length (67.5 ± 0.62) were recorded in monsoon season and the lowest mean length (51.25 ± 1.22) was recorded in post-monsoon season. The highest mean weights (3200 ± 40.31) were recorded in pre-monsoon season and the lowest mean weight (1200 ± 131.65) was recorded in post-monsoon season. The highest condition factors (1.14) were recorded in monsoon season.

Keywords: Seasonal Variation, Length-Weight, Condition Factor, *Katsuwonus pelamis*, Karachi, Pakistan.

Introduction

The family Scombridae, mackerels and tunas, includes 15 genera with 49 species that form the basis for some of the world's most important commercial fisheries (Randall, 1995). Skipjack tuna (*Katsuwonus pelamis*) are distributed throughout tropical oceans. For the past 30 years, they have been subjected to increasing exploitation. Although skipjack is the most important tuna resource for many countries, commercial fisheries usually prefer because of its high economic value. Extensive efforts are under way in many research laboratories around the world. Skipjack tuna found in offshore waters exhibit a strong tendency to school in surface waters with birds, drifting objects, sharks, and whales and may show a characteristic behavior like jumping, feeding, foaming, etc. Feed on fishes, crustaceans, cephalopods and mollusks; cannibalism is common. Spawn throughout the year in the tropics, eggs released in several portions (Muus & Nielsen, 1999).

Seasonal variability in weight and physiological condition related to feeding and reproduction has been observed in many fish species inhabiting temperate ecosystems (Schwalme & Chouinard, 1999; Craig *et al.*, 2000; Shulman, 2002). Condition factor (K) is a parameter that indicates to what extent the fish are healthy or their relative well-being. The variations in the condition factor reflect firstly their sexual developmental stage and feeding level (Wootton, 1990; Williams, 2000).

In this study, we investigate the seasonality of length, weight, condition factor and seasonal distribution of relatively frequency of various sized of fish *Katsuwonus pelamis* from the Coast of Karachi (Karachi Fish Harbour) west wharf Karachi.

Material and Method

The sample of fishes collected by Karachi fish harbour, West Wharf Karachi coast Karachi is located at 24⁰ 48 N latitude and 66⁰ 58 E longitude on the northeastern border of the Arabian Sea. The study area has shown in (Figure 1).

Results and Discussion

The length-weight relationships calculated by using the lengths and weights of the samples were found to be $W=0.0027L^{3.329}$ ($R^2= 0.991$) for pre-monsoon season, $W=0.0079L^{3.062}$ ($R^2= 0.993$) for monsoon season and $W=0.0004L^{3.802}$ ($R^2= 0.992$) for post-monsoon season. The slopes (b) of the length-weight regressions were ranged from 3.062 to 3.802. Türkmen & Akyurt (2000) and Erdoğan *et. al.*, (2002) reported similar patterns. Values of (b) are often 3.0 and generally between 2.5 and 4.0 (Ricker, 1975). The slopes of length-weight regressions for fish may show differences to fish age, feeding, sampling season, species, sex, maturity and other environmental conditions may affect “b” values.

Table 1. Mean length (L), mean weight (W), mean condition (K) values, maximum (Max.), minimum (Min.), and Standard error (SE) of *Katsuwonus pelamis* fishes of four fork length classes during (Jan.2011-Dec.2011)

Size (cm)	N	Mean± SD (Length)	Mean± SD (Weight)	Max.	Min.	K	SE
49-54	30	51.3± 1.7	1300±192.5	54	49	0.9536	0.241
55-60	60	57.0± 1.5	1900±162.2	60	55	1.1022	0.201
61-66	86	62.0± 1.4	2600±225.4	65	61	1.0630	0.162
67-72	48	67.3± 1.1	3200± 92.5	68.5	67	1.0447	0.082
Total	224	61.0± 5.1	2400±620.9	68.5	49	1.1226	0.242

The length, weight and condition factor data were recorded in (224) fishes of *Katsuwonus pelamis* in three different (pre-monsoon, monsoon, post-monsoon) season of the year (January 2011-December 2011) from the coast of Karachi. The mean length, weight, condition factor data were showed in Table 1, 2, 3, 4 respectively.

The highest condition factors (1.14) were recorded in monsoon season (Table 3). Four classes of the fishes were represented in all seasons (pre-monsoon, monsoon, post-monsoon) seasons, (49-54 cm), (55 to 60 cm), (61-66 cm), (67-72 cm) (Table 1).

Table 2. Mean length (L), mean weight (W), mean condition (K) values, maximum (Max.), minimum (Min.), and Standard error (SE) of *Katsuwonus pelamis* fishes of four fork length classes during Pre-monsoon season.

Size (cm)	N	Mean± SD (Length)	Mean± SD (Weight)	Max.	Min.	K	SE
49-54	8	51.8± 1.8	1350±168.5	54	49	0.9743	0.009
55-60	21	57.0± 1.6	1900±178.6	60	55	1.0250	0.0032
61-66	18	63.0± 1.5	2800±214.2	65	61	1.0967	0.004
67-72	16	67.5± 0.4	3200± 40.3	68	67	1.0525	0.003
Total	63	61.0± 5.5	2500±673.9	68	49	1.0523	0.004

The highest catch of fish (87) was recorded in post-monsoon season and the lowest catch of fish (63) was recoded in pre-monsoon season. The highest mean lengths (67.5 ±0.62) were recorded in monsoon season (Table 3). The lowest mean length (51.25±1.22) was recoded in post-monsoon season (Table 4). The highest mean weights (3200±40.31) were recorded in pre-monsoon season (Table 2) and the lowest mean weight (1200±131.65) was recorded in post-monsoon season (Table 4).

Table 3. Mean length (L), mean weight (W), mean condition (K) values, maximum (Max.), minimum (Min.), and Standard error (SE) of *Katsuwonus pelamis* fishes of four fork length classes during monsoon season.

Size (cm)	N	Mean± SD (Length)	Mean± SD (Weight)	Max.	Min.	K	SE
49-54	12	51.5± 1.2	1350±100	53.5	50	0.9843	0.340
55-60	26	57.0± 1.3	1900±162.5	59	55	1.0305	0.262
61-66	24	63.0± 1.3	2400±175.1	65	61	1.0059	0.265
67-72	12	67.5± 0.6	2600±150.5	68.5	67	1.0167	0.179
Total	74	59.0± 5.4	2200±599.9	68.5	50	1.1453	0.263

Seasonal declines in weight and condition typically occur during reproductive periods as fish use energy for gonad development and spawning behaviour (Cubillos *et al.*, 2001; Erdoğan *et al.*, 2002; Lucifora *et al.*, 2002; Shulman, 2002; Türkmen & Akyurt, 2000).

Table 4. Mean length (L), mean weight (W), mean condition (K) values, maximum (Max.), minimum (Min.), and Standard error (SE) of *Katsuwonus pelamis* fishes of four fork length classes during Post-monsoon season.

Size (cm)	N	Mean± SD (Length)	Mean± SD (Weight)	Max.	Min.	K	S.E
49-54	10	51.3± 1.2	1200±131.7	53	49.5	0.9002	0.1129
55-60	13	56.5± 1.2	1700±119.3	58	55	0.9808	0.0057
61-66	44	61.3± 1.0	2400±195.1	63	61	1.0761	0.0037
67-72	20	65.5± 1.2	3050±155.2	67.3	64.3	1.0761	0.0037
Total	87	61.0± 4.5	2400±598.2	67.3	49.5	1.0665	0.0025

The seasonal distribution of relative frequency of variously sized of fishes was shown in (Table 5). Size wise relative condition factor (K) was shown in (Figure 2).

Table 5. Seasonal distribution of relative frequency of variously-sized fishes of *Katsuwonus pelamis* from Karachi coast.

Size (cm)	Pre-monsoon season	Monsoon season	Post monsoon season
49-54	19.047 (12)	22.973 (17)	17.243 (15)
55-60	25.397 (16)	28.378 (21)	22.982 (20)
61-66	28.571 (18)	32.432 (24)	44.826 (39)
67-72	26.984 (17)	16.216 (12)	14.942 (13)
N	(63)	(74)	(87)

Some studies have linked seasonal variability in fish condition with the quality and market value of harvested fish (Bjarnason, 1995; Schwalm & Chouinard, 1999), but only a few attempts have been made to optimize harvesting strategies (e.g. timing of fishing) in relation to biological cycles or to address the related economic benefits (Larkin & Sylvia, 1999).

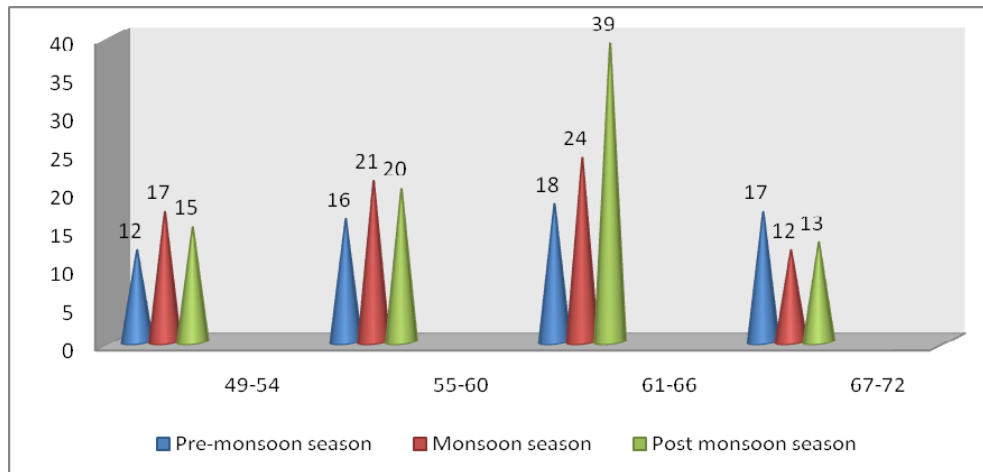


Figure 2. Size-wise relative condition factor (K) for *Katsuwonus pelamis*

The seasonal variation of K in plaice of the south-eastern North Sea and found that the better the nutritional condition, the higher is K. The use of the length-weight coefficient as the condition factor, also realized that differences in condition factor are directly proportional to differences in weight (Heincke, 1908). K is a good indicator of fish well being in the natural habitat over time since K equation is based on body weight and length. Both revealed the growth profile either speed up or retard. The results showed that K varied mainly with season. This could be attributed to the fluctuation in food availability and consumption of both species following the seasonal variation in the primary productivity in Gulf of Aqaba (Badran, 2001; Al-Najjar, 2004; AlZibdah *et al.*, 2005).

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