CHAPTER 5

PHYSICO-CHEMICAL CHARACTERISTIC OF KUNG KRABAEN BAY

A. Water Temperature

The measurement of temperature was conducted above sediment before the core samplers had been operated. The results clearly showed seasonal variation in temperature occurrence in dry and rainy seasons. In wet season, average temperature of different sampling sites along the coastline toward the bay mouth ranged from $29.22 \pm 0.10\ ^{o}C$ to $30.83 \pm 1.11\ ^{o}C$. While higher range of temperature of $30.82 \pm 0.26\ ^{o}C$ to $32.17 \pm 1.99\ ^{o}C$ was found in dry season (Figure 5.1). Mean temperature for the coastal stations outside the bay was $30.13 \pm 0.15\ ^{o}C$ and $29.22 \pm 0.11\ ^{o}C$ in dry and wet season, respectively (Table 5.1).

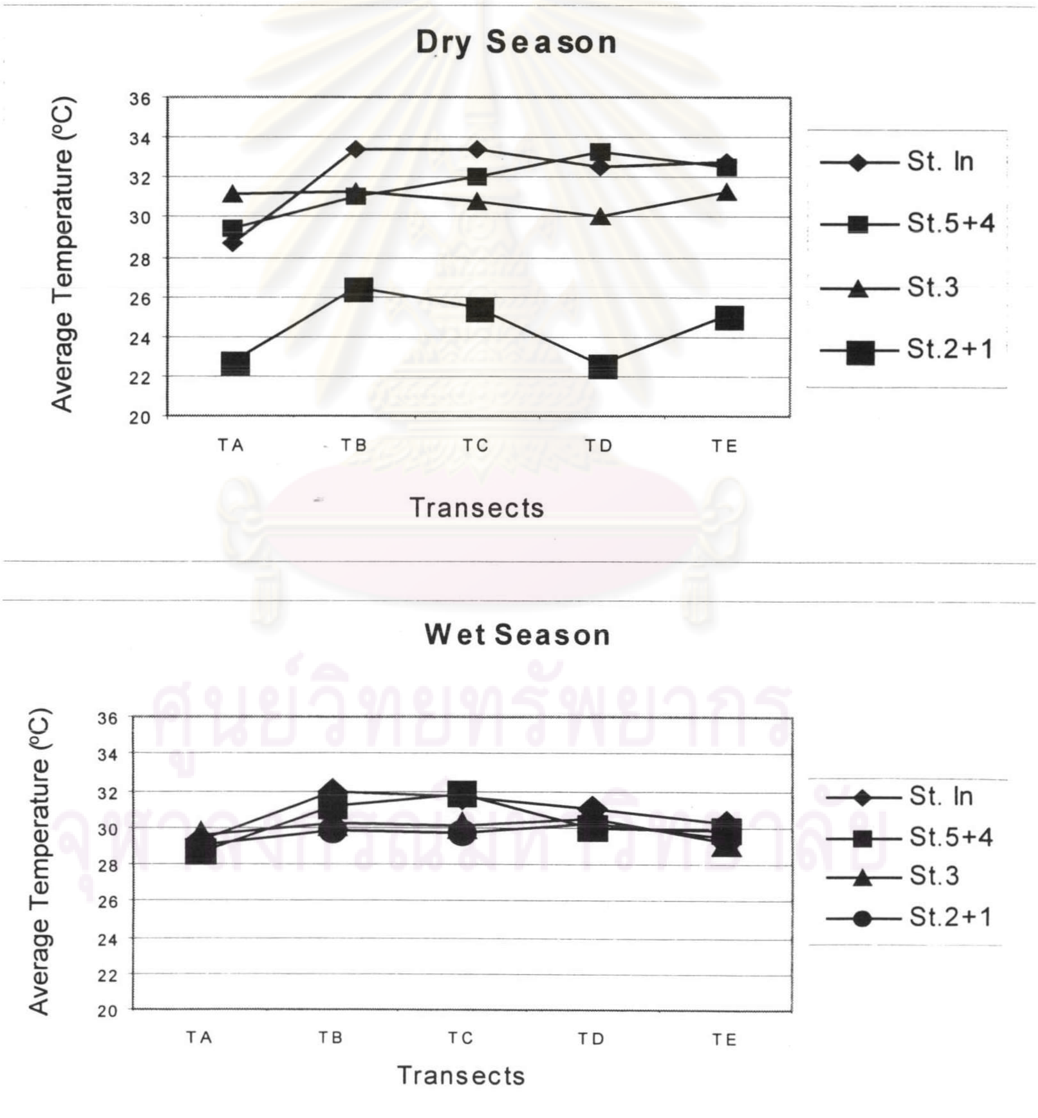


Figure 5.1 Average temperature (^{o}C) among Transects of Kung Krabaen Bay, Chathaburi Province during dry (January –April) and wet (August-November) season, 2000.

Table 5.1 Average temperature (°C) on the coastal stations outside Kung Krabaen Bay during dry (January-April) and wet (August-November) season, 2000.

Coastal Stations	Dry Season	Wet Season
C1	30.1	29.3
C2	30.0	29.1
C2	30.3	29.3
Average	30.1	29.2
S.D.	0.15	0.10

Monthly variations of temperature were shown in Figure 5.2. Low temperature appeared in the cold and dry month of January and November while high temperatures occurred in the warm month of April and August.

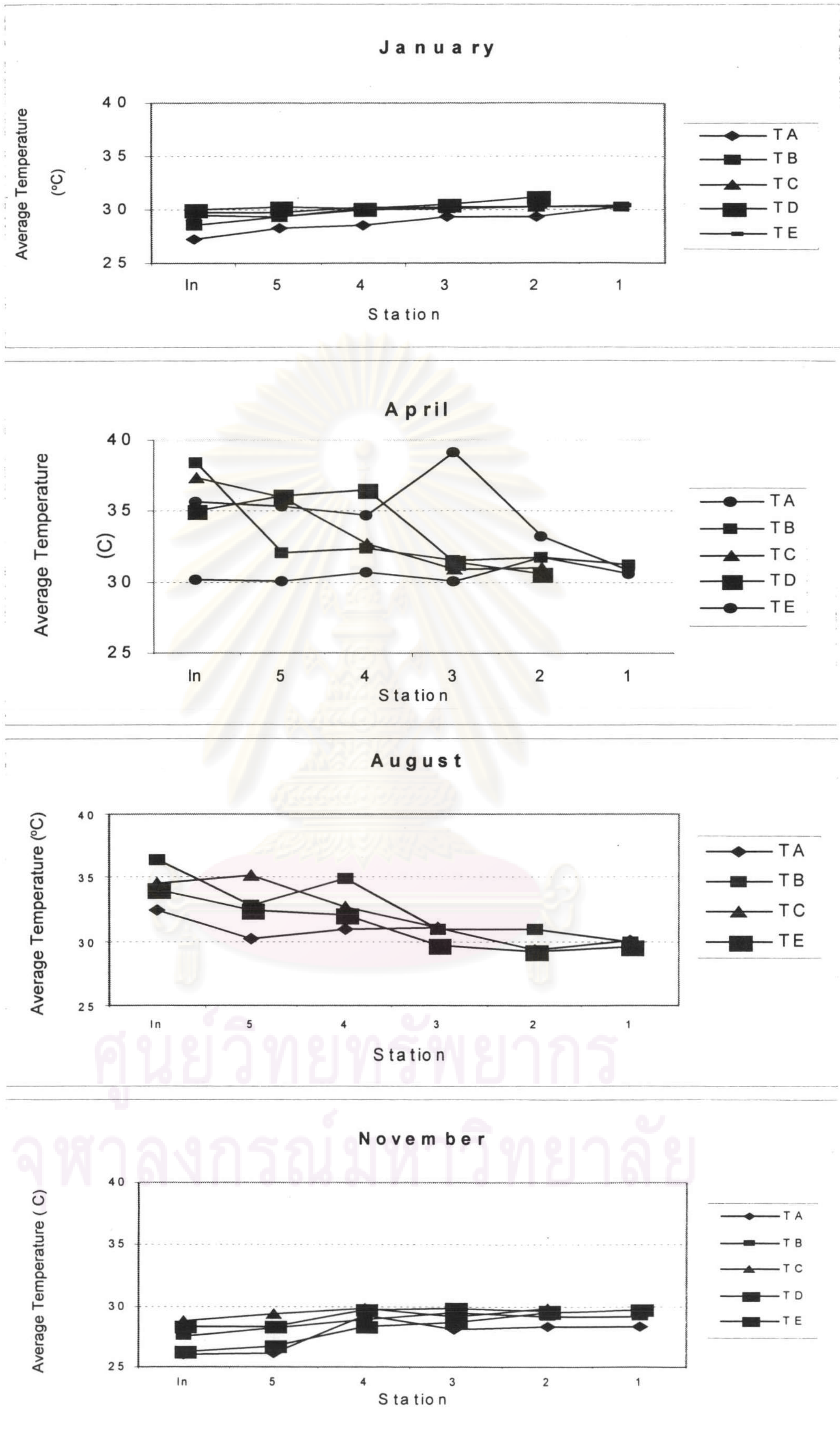


Figure 5.2 Average temperature by stations in 4 sampling months: January, April, August and November 2000

B. Salinity of water

Water salinity in study area showed much distinct difference between dry and wet season. The mean average salinity in dry season varied from 24.5 $\pm$ 1.7 to 30.9 $\pm$ 0.5 psu. while in wet season salinity was found ranging from 20.0 $\pm$ 4.3 to 25.3 $\pm$ 2.0 psu (Figure 5.3). Seawater outside the bay had salinity of 31.7 $\pm$ 0.1 and 28.5 $\pm$ 0.0 psu in dry and wet season, respectively (Table 5.4).

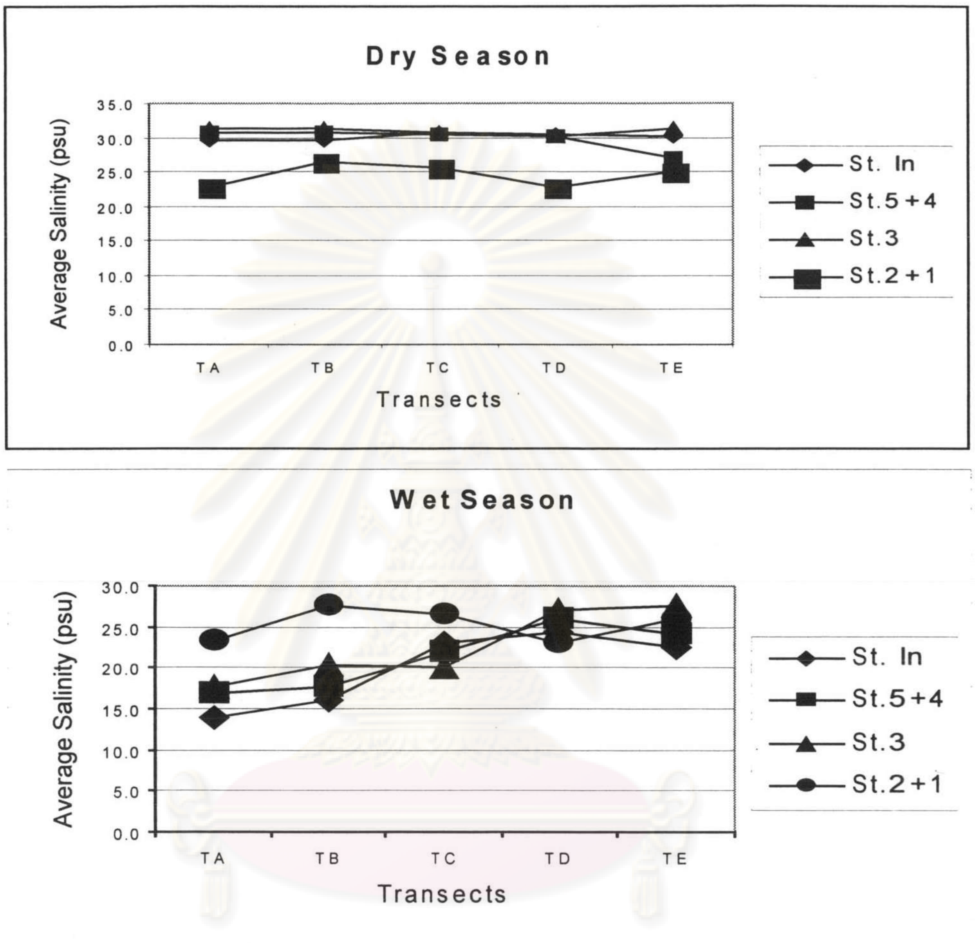


Figure 5.3 Average salinity (psu) among Transects of Kung Krabaen Bay, Chathaburi Province during dry (January –April) and wet (August-November) season, 2000.

This salinity variation among sampling period was probably caused by tidal current between outside seawater and inside the Bay. In dry season, namely January, April and November average salinity were high at most stations except Station In where salinity appeared lower than stations inside the Bay (Figure 5.4).

It was prior concluded that salinity of seawater in the bay effected by freshwater runoff and seawater exchanged by tidal current. Lower salinity could be found inner the canal and slightly increased facing to central of the bay. In wet season (August) the lowest salinity was presented and it was appeared that Transect A and B had very low average salinity. This could be considerable that TA and TB were natural canal but TC, TD and TE were man-made canal for drainage waste water from shrimp culture purposes.

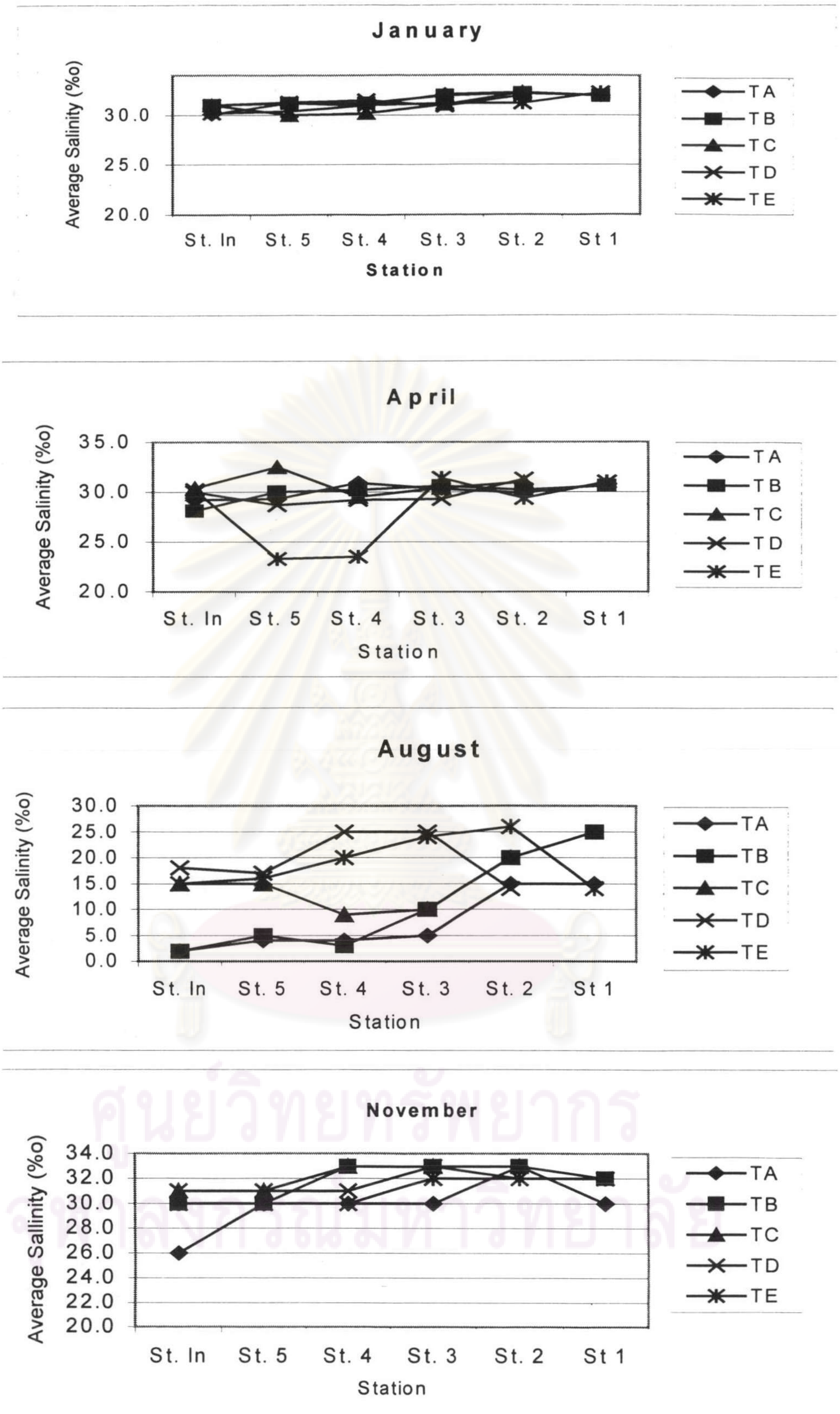


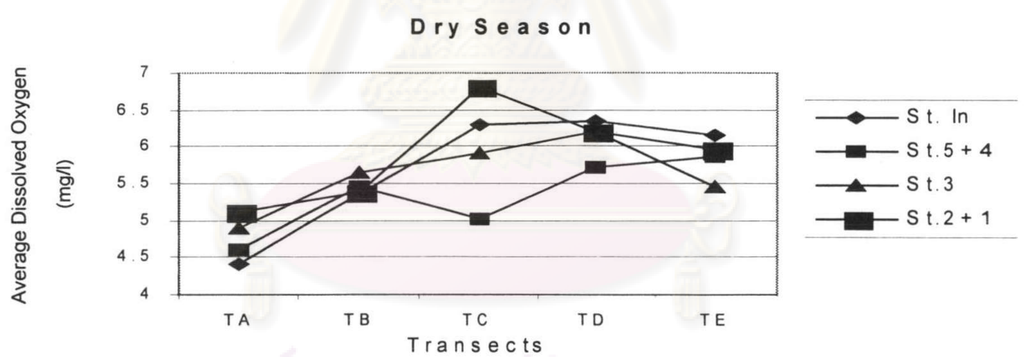
Figure 5.4 Average salinity curves by stations among sampling transects in January, April, August and November.

Table 5.2 Average salinity (psu) on the coastal stations outside Kung Krabaen Bay during dry (January-April) and wet (August-November) season, 2000.

Coastal Stations	Dry Season	Wet Season
C1	31.7	28.5
C2	31.8	28.5
C2	31.6	28.5
Average	31.7	28.5
S.D.	0.08	0.0

C. Dissolved Oxygen at Water Bottom

The measurement of dissolved oxygen was conducted in the water column above sediment surface before the core sampler had been operated. Mean concentration of dissolved oxygen was in the range of 6.38 ± 0.53 to 7.67 ± 1.67 mg/l in wet season and 5.34 ± 0.52 to 5.89 ± 0.67 mg/l for dry season (Figure 5.4). The variation of dissolved oxygen among transects was narrowest in dry period of January and November. In the warm and dry period of April, the variation among transects was almost 4 mg/l (Figure 5.5). The mean average dissolved oxygen was lowest in April while the highest value occurred in November and giving range of oxygen from 4.7 to 7.2 mg/l. The range of dissolved oxygen concentration at the coastal stations outside the bay were in same range found in the sampling stations in the bay, 7.80 ± 0.35 mg/l and 6.36 ± 0.03 mg/l for wet and dry season, respectively (Table 5.6).



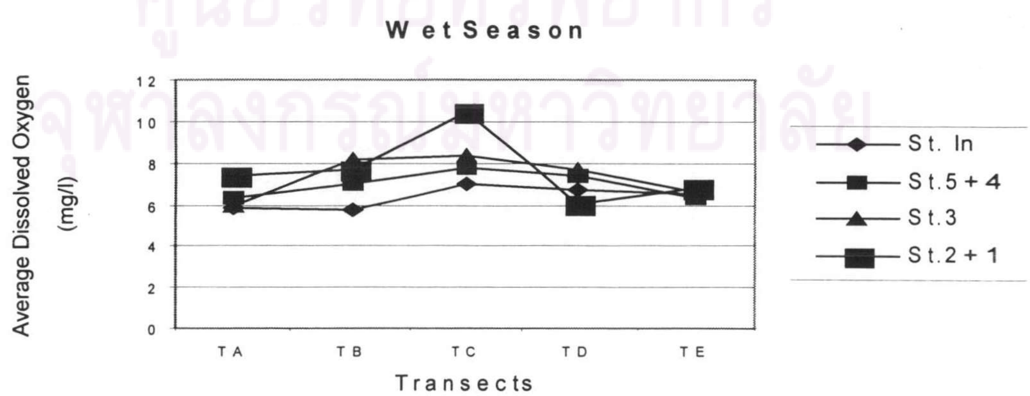


Figure 5.5 Average dissolved oxygen (mg/l) among Transects in Kung Krabaen Bay during dry and wet season, 2000.

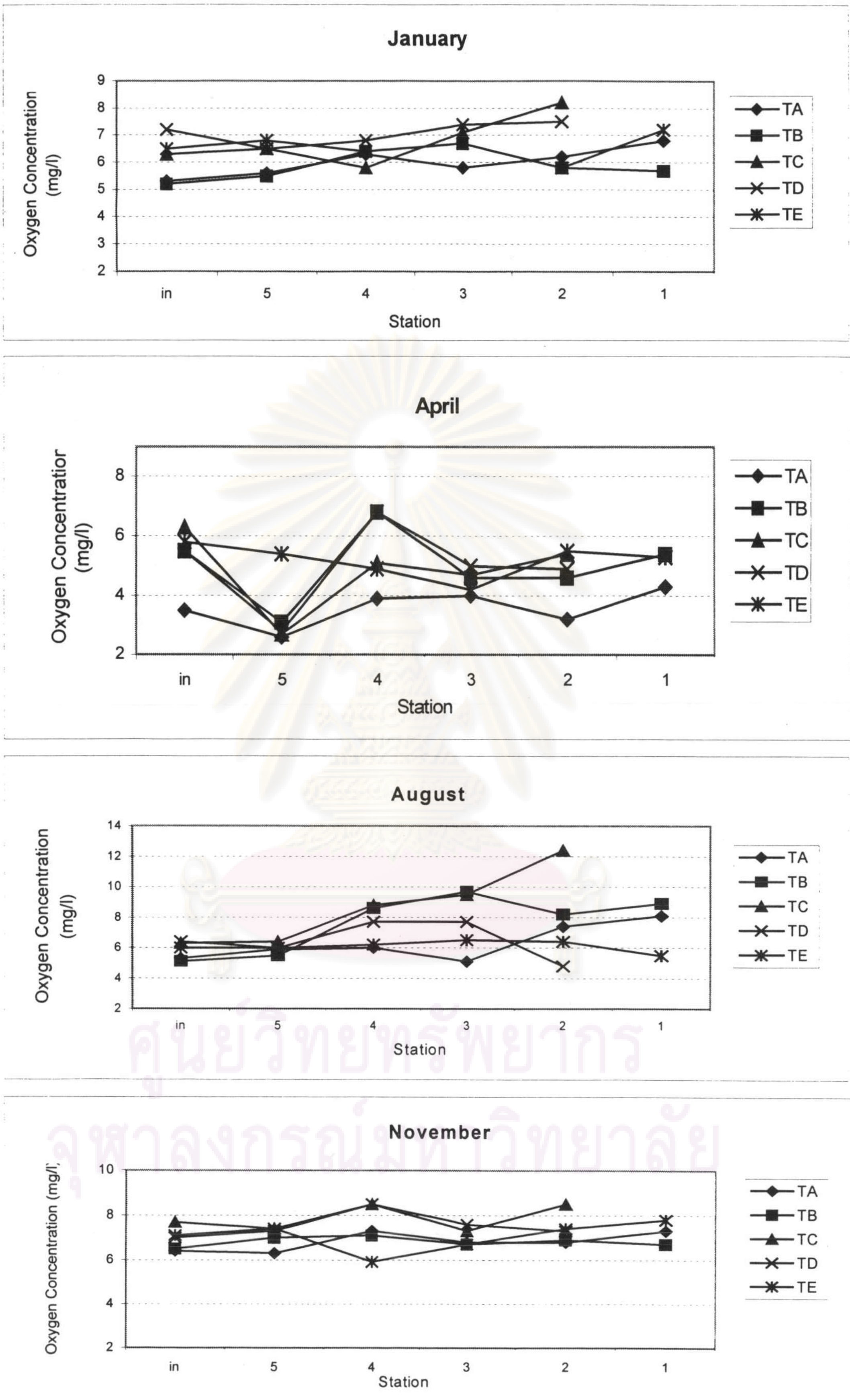


Figure 5.6 Dissolved oxygen concentration (mg/l) by station for 5 transects sampling: January, April, August and November in 2000.

Table 5.3 Average dissolved oxygen (mg/l) on the coastal stations outside Kung Krabaen Bay during dry (January-April) and wet (August-November) season, 2000.

Coastal Stations	Dry Season	Wet Season
C1	6.37	7.4
C2	6.37	8.05
C2	6.33	7.95
Average	6.36	7.80
S.D.	0.03	0.35

D. Sediment Types

Sediment is an important factor which can limit the benthic infauna on their abundance and distribution. The results showed variation of sediment composition in space and time. The description of sediment type was given for each sampling station from transects. Size of sediment particle was presented in group of >2 mm (abbreviate by G2), 2-1 mm (G1), 1-0.5 mm (G05), 0.5-0.25 mm (G025), 0.25-0.125 mm (G0125), 0.125-0.063 mm (G0063), and <0.063 mm (G<0063).

In wet season, the sediment type along the inner stations in the canals was medium sand to fine sand with the majority of particles were in range of 0.125-0.250 mm and 0.063-0.125 mm, respectively. The bay sediment was however composed of fine sand as well as the coastal sediment outside the bay with the exception of station C3 where sediment type was mainly very fine sand (<0.063 mm). The composition of sediment in both the canals and the bay during wet season was very much the same as in the wet season composing of medium and sand and fine sand. On contrary, the sediment at the coastal stations outside the bay were mainly very fine sand (Table 5.4 and 5. 5).

Table 5.4 Grain size composition (%), median grain size (ϕ) and sediment type in Kung Krabaen Bay, Chanthaburi Province, during dry (January–April) season, 2000.

Station	Transect	G2	G1	G05	G025	G0125	G0063	G <0063	Median Grain (ϕ)	Sediment type
St. In	TA	8.25	4.25	7.4	16.95	34.4	14.5	14.25	2.55	Medium sand
	TB	18.4	4.8	5.5	5.9	19.05	22.05	24.3	2.85	Medium sand
	TC	6.05	1.25	1.45	4.6	27.2	34.4	25.05	3.4	Fine sand
	TD	3.7	1.95	3.3	6.6	11.05	21.1	52.3	3.9	Fine sand
	TE	6.7	3	4.55	10.15	21	26.1	28.5	3.15	Fine sand
	avg	8.62	3.05	4.44	8.84	22.54	23.63	28.88	3.17	Fine sand
	sd	5.7071	1.496	2.2437	4.97813	8.7884	7.32031	14.1273	0.517928567	
St.5+4	TA	3.075	3.35	5.625	10.275	20.775	19.325	37.575	3.475	Fine sand
	TB	2.8	2.05	3.8	9.35	20.4	29.175	32.425	3.5	Fine sand
	TC	2.2	1.55	1.975	3.475	10.175	35.175	45.45	3.825	Fine sand
	TD	7.225	3	3.8	8.675	17.025	23.325	36.95	3.35	Fine sand
	TE	1.025	1.225	2.45	8.775	16.15	24.75	45.625	3.7	Fine sand
	avg	3.265	2.235	3.53	8.11	16.905	26.35	39.605	3.57	Fine sand
	sd	2.3498	0.915	1.4247	2.66784	4.274	6.06058	5.76903	0.18990129	
St.3	TA	0.25	1.15	3.95	4.3	6.95	22.25	61.15	4.2	Very fine sand
	TB	1.35	1.55	2.9	4.95	10.95	22.85	55.45	3.9	Fine sand
	TC	0.7	1.45	2.05	2.8	5.95	57.8	29.25	3.85	Fine sand
	TD	3.05	2.15	1.7	1.9	6.6	34.35	50.25	3.65	Fine sand
	TE	1.25	0.6	0.8	3.25	9.4	41.55	43.15	3.9	Fine sand
	avg	1.32	1.38	2.28	3.44	7.97	35.76	47.85	3.9	Fine sand
	sd	1.064	0.567	1.1993	1.20799	2.1168	14.7518	12.3335	0.196850197	
St.2+1	TA	2.325	2.975	4.625	11.425	32.975	22.175	23.5	2.95	Medium sand
	TB	0.675	0.45	0.875	1.625	8.2	59.925	28.25	3.275	Fine sand
	TC	1	1.2	3.05	4.7	5.9	46.65	37.5	3.55	Fine sand
	TD	0.2	0.1	0.5	1.4	14.4	62.1	21.3	3.3	Fine sand
	TE	1.925	1.45	2.25	4.75	15.35	44.6	29.675	3.575	Fine sand
	avg	1.225	1.235	2.26	4.78	15.365	47.09	28.045	3.33	Fine sand
	sd	0.8809	1.116	1.6758	4.04789	10.63	15.9467	6.28983	0.253352521	
C1		0	0.45	1.1	1.1	3.2	27	67.15	4.25	Very fine sand
C2		1	1.4	3.9	8.05	11.6	23.65	50.4	4.25	Very fine sand
C3		1.45	1.2	5	9.65	11.1	22.75	48.85	4.05	Very fine sand
	avg	0.8167	1.017	3.3333	6.26667	8.6333	24.4667	55.4667	4.183333333	Very fine sand
	sd	0.7422	0.501	2.0108	4.54542	4.712	2.23961	10.1477	0.115470054	

Table 5.5 Grain size composition (%), median grain size (ϕ) and sediment type in Kung Krabaen Bay, Chanthaburi Province, during wet (August–November) season, 2000.

Station	Transect	G2	G1	G05	G025	G0125	G0063	G <0063	Median Grain (ϕ)	Sediment type
St. In	TA	1.1	2.35	6.9	16	45.8	13.1	14.75	2.45	Medium sand
	TB	7.65	1.9	3	6.55	61.3	15.85	3.7	2.5	Medium sand
	TC	0.5	3.85	7.3	7.6	16.95	29.5	34.3	4	Very fine sand
	TD	1.4	1.5	5	8.55	25.25	27.15	31.15	3.55	Fine sand
	TE	0.7	1.55	3.7	8.95	34.95	38.15	12	3	Fine sand
	avg	2.27	2.23	5.18	9.53	36.85	24.75	19.18	3.1	Fine sand
	sd	3.0277	0.9673	1.89921	3.73373	17.4075	10.2812	13.0643	0.6717514	
St.5+4	TA	0.675	3.625	6.525	7.95	18.725	31.675	30.825	3.375	Fine sand
	TB	3.775	2.275	2.4	3.825	22.025	53.925	11.775	3.15	Fine sand
	TC	1.875	2.275	5.725	6.825	21.075	35.85	26.375	3.55	Fine sand
	TD	6.075	4.35	4.95	7.3	26.25	20.425	30.65	3.125	Fine sand
	TE	3.25	2.275	4.8	7.05	30.525	30.65	21.45	3.075	Fine sand
	avg	3.13	2.96	4.88	6.59	23.72	34.505	24.215	3.255	Fine sand
	sd	2.0436	0.9724	1.54772	1.60201	4.67782	12.2481	7.93986	0.2010908	
St.3	TA	3.45	3.8	6.15	8.95	19.2	13.45	45	3.45	Fine sand
	TB	0.9	0.7	1.4	1.85	12.25	35.15	47.75	3.8	Fine sand
	TC	1.1	1.75	2.6	2.8	7.15	38.85	45.75	3.85	Fine sand
	TD	4.35	1.65	1.75	2.1	13.05	45.8	31.3	3.65	Fine sand
	TE	0.65	4	5.5	5.2	12.45	37.4	34.8	3.55	Fine sand
	avg	2.09	2.38	3.48	4.18	12.82	34.13	40.92	3.66	Fine sand
	sd	1.6902	1.4485	2.19676	2.97712	4.28276	12.2256	7.35906	0.167332	
St.2+1	TA	3.975	4.175	7.05	10.55	21.85	23.25	29.15	3.05	Fine sand
	TB	1.95	2.775	3.075	3.65	13.85	43.4	31.3	3.6	Fine sand
	TC	0.65	1	2.15	3.65	14.35	57.05	21.15	3.5	Fine sand
	TD	0.15	1.65	4.8	5.85	17.05	43.5	27	3.45	Fine sand
	TE	0.95	2.45	4.65	8.625	34.925	27.575	20.825	3.075	Fine sand
	avg	1.535	2.41	4.345	6.465	20.405	38.955	25.885	3.335	Fine sand
	sd	1.5141	1.2058	1.87403	3.06511	8.71501	13.6381	4.7236	0.2547057	
C1		0	0.45	1.1	1.1	3.2	27	67.15	3.85	Fine sand
C2		1	1.4	3.9	8.05	11.6	23.65	50.4	3.75	Fine sand
C3		1.45	1.2	5	9.65	11.1	22.75	48.85	4.05	Very fine sand
	avg	0.8167	1.0167	3.33333	6.26667	8.63333	24.4667	55.4667	3.8833333	Fine sand
	sd	0.7422	0.5008	2.0108	4.54542	4.71204	2.23961	10.1477	0.1527525	

<u>Transect A</u>

This transect located at north part of the Bay where surrounded by fisherman village along north bank. The site of this area seemed to be sheltered from current action by water movement in and off the Bay through the bay's entrance. This transect was seemly drawn along the trough for fishing boat passage during the ebb tide.

The results of grain size composition of Station In, 5, 4, 3, 2, and 1 were showed on their variations in sampling months, namely January, April, August and November.

a. Station Inner Canal (St. TAin)

At Station In (Figure 5.7), the composition of grain size were seasonally varied from January to November that the grain size larger than 2 mm slightly decreased in proportion from January to November, namely 5.4, 11.1, 2.1, and 0.1% respectively. Grain size of 2-1 mm, 1-0.5 mm and 0.5-0.125 mm were represented lower than 20% of total composition, Grain size of fine sand was distinctly contributed at higher proportion approximately 35, 33.8, 46.6 and 45% in January, April, August and November respectively. Very fine sand and silt-clay proportion were at lower proportion than 20%. Based on the median grain size and sorting index (Inclusive Standard Deviation Index) as suggested by Gray (1981) (Table 5.6), the sediment type of this station was major median sand with poorly sorted. The same phenomenon could be found in those sampling months, January, April, August and November. There was obvious that the fine sand composition (G0125) slightly increased from August to November whilst the medium sand (G025) gradually decreased its composition from the same months. This change might cause by the current and wave action during the SW Monsoon forced finer grain from coastal flat into the canal.

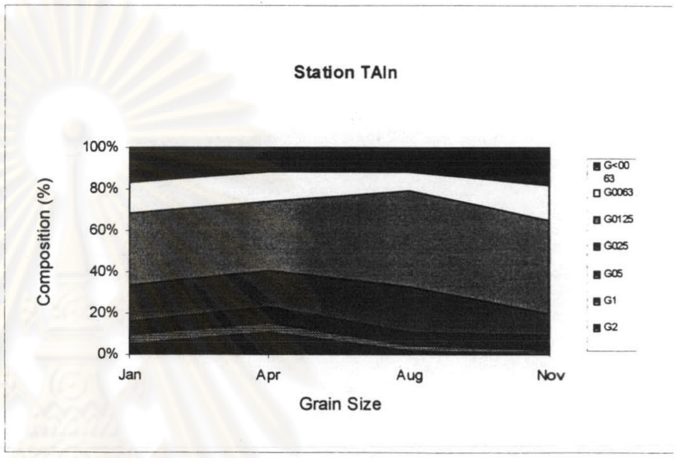


Figure 5.7 Grain size composition (%) at Station In of Transect A by sampling months

Table 5.6 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station In of Transect A among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.8	Medium sand	1.60	Poorly sorted
April	2.3	Medium sand	1.38	Poorly sorted
August	2.2	Medium sand	1.16	Poorly sorted
November	2.7	Medium sand	1.29	Poorly sorted

b. Station 5 (St. TA5)

Station 5 of Transect A was located at the mouth of canal. Figure 5.8 showed grain size composition among the sampling months, January, April, August and November proportion. It was found that the grain size of coarse sand (G2, and G1 shared as minor proportion less than 10% of total proportion in all sampling months while medium sand (G025) slightly higher proportion of 31.4 and 34.4, in January and April and trended gradually decreased to 27.3 and 14.1% in August and November respectively while the fine sand (G0125) shared of higher proportion of 31.4 and 34.4% in January and April respectively but slightly decreased to 27.3 and 14.1 % in August and November respectively. The very fine sand and silt-clay contributed 19.6 and 27% in January but slightly decreased amount in April to 11 and 13% respectively. In August and November high content of very fine sand and silt-clay became distinct major groups of highest proportion which contributed 21.8 and 45.1% of very fine sand and 21.5 and 33.4% of silt-clay respectively.

The consideration of sediment type and degree of sorting, the results were showed in Table 5.7. It was concluded that sediment type in this station had change seasonally from medium sand type in January and April becoming fine sand type in August and November. The composition of sediment in this station was variation of grain proportion that caused of the poor degree of sorting in all samples.

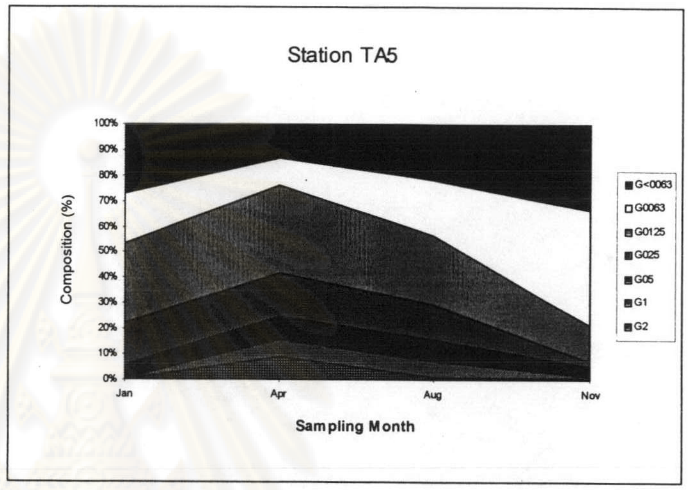


Figure 5.8 Grain size composition (%) at Station 5 of Transect A by sampling months

Table 5.7 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 5 of Transect A among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.9	Medium sand	1.3	Poorly sorted
April	2.7	Medium sand	1.51	Poorly sorted
August	3.8	Fine sand	1.21	Poorly sorted
November	3.7	Fine sand	1.09	Poorly sorted

c. Station 4 (St TA4)

Station 4 located at more offshore site approximate 500 m from the mouth of canal or Station 5. Figure 5.9 presented grain size composition in percentage of Station 4 sediment in Transect A among sampling months, namely January, April, August and November. Grain size of coarse sand groups (G2, G1 and G05) and medium sand (G025) appeared as minor portion of grain size composition that contributed lowered than 20% of total composition. Very fine sand proportion was at intermediate group shared 24.7, 22, 14.7 and 45.1% of sediment composition in January, April, August and November respectively. It trended a higher proportion nearly 50% in November. Silt-clay showed significantly highest proportion in this station. It contributed 59, 51.3, 35 and 33.4% in January, April, August and November respectively. The silt-clay content was highest in January but slightly decreased in the sequent months and found lowest in November, 33.4%.

From Figure 5.9, the coarse and medium sand proportion (G2-G0125) were lower content in January and April the period of calm sea. The peak of coarse and medium sand was distinctly apparent in August, the period of the SW Monsoon, but slightly lower in November as the same situation of silt-clay content . However, the very fine sand was the highest component of sediment composition in November or the transition between the SW Monsoon and the NE Monsoon.

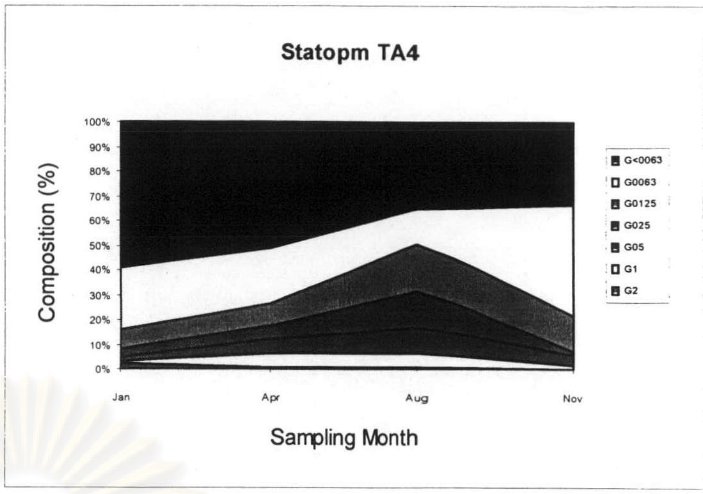


Figure 5.9 Grain size composition (%) at Station 4 of Transect A by 4 sampling months

Table 5.8 presented the median grain size which showed a change of sediment type and sorting index. It was considerable that the sediment type in January and April, period of dry season, were characterized by very fine sand but in August and November, period of wet season and transition month, became coarser grain as fine sand. This might explained that there was remarkably seasonal change.

Table 5.8 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 4 of Transect A among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.2	Very fine sand	1.0	Poorly sorted
April	4.1	Very fine sand	1.08	Poorly sorted
August	3.0	Fine sand	1.29	Poorly sorted
November	3.0	Fine sand	1.31	Poorly sorted

d. Station 3 (St TA3)

The proportion of coarse sand (G2, G1, G05) at station 3 contributed lower than 10% while the medium sand (G025) contributed ranging 5,3.6,14.9 and 3% in January, April, August and November respectively. Similar to fine sand (G0125) formed a higher peak of 34.8% proportion in August. The very fine sand component (G0063) appeared lower proportion (19.8%) in January and slightly increased to 24.7% of proportion in April but decreased in August and November. Silt-clay shared a major group proportion in sediment this station. The higher proportion occurred in January (63%) and April (59.3%) but slightly decreased of 14% in August. In November. Silt-clay became a major proportion of 76% which the highest composition in this sample month (Figure 5.10).

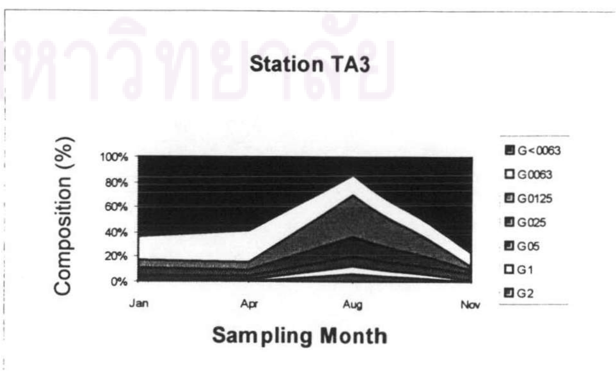


Figure 5.10 Grain size composition (%) at Station 3 of Transect A by sampling months

From Table 5.9 it was found that sediment type of this station was highly content of very fine sand and silt-clay for January, April and November. But in August fine sediment was disappeared forcing by wave and current action during the SW Monsoon. The degree of sorting could describe that the sediment of this station was dominated by very fine sediment, mainly very fine sand and mud.

Table 5.9 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 3 of Transect A among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.2	Very fine sand, silt-clay	1.0	Poorly sorted
April	4.2	Very fine sand, silt-clay	0.96	Moderately sorted
August	2.6	Medium sand	1.57	Poorly sorted
November	4.3	Very fine sand, silt-clay	0.99	Moderately sorted

e. Station 2 (St TA2)

The result of grain size composition was presented in Figure 5.11. The coarse sand groups (G2, G1 and G05) were found in small component of less than 10% while the medium sand (G025) varied 2.5 to 16.4% of sediment, lowest in November and highest in August. Fine sand shared a major component in January and April by proportion of 62.2 and 45.5% respectively. Its proportion in a decreasing proportion in August and November, from 26.1 to 12.8% respectively. Very fine sand was contributed to a range of 7.9 to 45% with higher proportions in April and November. It was considerably that low content of silt-clay occurred in January and April but distinctly increase to higher proportion of 30.2% and 35.6% in August and November.

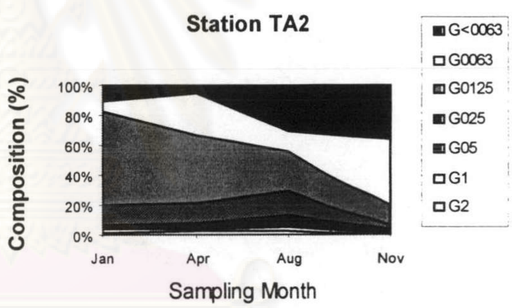


Figure 5.11 Grain size composition (%) at Station TA2 of Transect A by 4 sampling months

From Table 5.10, medium to fine sand were characterized the sediment in this station. The unstable of composition was apparent that the sorting index were showed a poorly sorted sediment of the area. The variation might be caused by seasonal change of wave and current force during a change between wet season and dry season.

Table 5.10 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 2 of Transect A among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.4	Medium sand	1.0	Poorly sorted
April	3.2	Fine sand	1.14	Poorly sorted
August	2.8	Medium sand	1.48	Poorly sorted
November	3.7	Fine sand	0.88	Moderately sorted

f. Station 1 (St TA1)

This station was closely located to the Bay's entrance. Grain size composition in 4 sampling months were presented by Figure 5.12. The result showed that high content of silt-clay of 51% occurred while the very fine sand was intermediately contributed only 37.1%. Coarse sand groups (G2, G1 and G05) shared a minor component of less than 10%. In April, the proportion of silt-clay and very fine sand were slingtly decreased whilst coarse sand and medium sand component increased their proportion gradually. However, silt-clay was the major component in April by the proportion of 27.2%. The proportion of silt-clay increased again in August. The trend of high proportion of coarse and medium sand increased in November while silt-clay content was dropped to 15.4%.

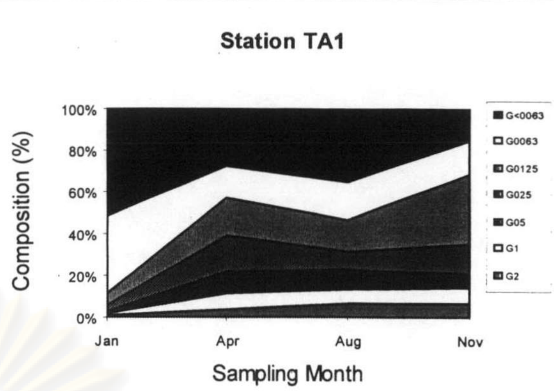


Figure 5.12 Grain size composition (%) at Station 1 of Transect A by sampling months

There was seasonal variation in sediment composition. Table 5.11 showed median grain size which varied from very fine sand to medium sand. The degree of sorting was poor during the rainy season.

Table 5.11 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 2 of Transect A among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.0	Very fine sand	0.9	Moderately sorted
April	2.2	Medium sand	1.6	Poorly sorted
August	3.2	Fine sand	2.12	Very poorly sorted
November	2.5	Medium sand	1.66	Poorly sorted

Transect B (TB)

a. Station TB In

The grain size composition at this station was presented in Figure 5.13. This station was lied in natural canal, Klong Hin, at northern part of the Bay. Grain size larger than 2 mm (G2) varied from large composition 20.7% in January and slightly diminished in April, August and November being 16.1, 14.2 and 1.3% respectively. Grain size smaller than 1 mm to 0.25 mm shared lesser than 10%. Medium sand grain of size between 0.125 – 0.25 mm shared highest composition, ranging from 9.6% to 69.3%, with the lowest composition in

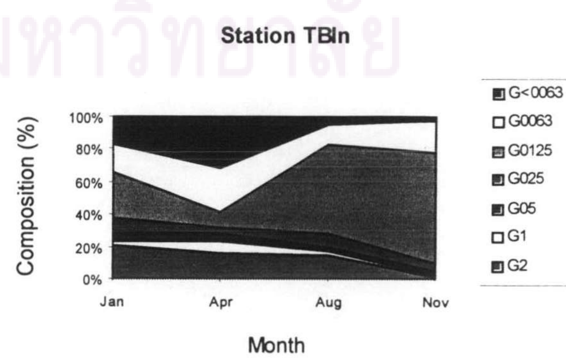


Figure 5.13 Grain size composition by sampling months at Station In of Transect B

April but the highest composition in November. Fine grain size of sediment between size 0.063-0.125 mm contributed ranging from 12.6 to 26.7% in which the highest value was in April and the lowest in August. Silt-clay composition was highest in April, 31.8%, while the lowest value was in August, 4.7%. There was clear evident that high composition of silt-clay particle was abundant in January and April but diminishing in Augu st and November.

Median grain size distributed between medium sand (2.4 ϕ) to fine sand (3.3 ϕ). Medium sand occurred in January, August and November while fine sand occurred in April. When considering the degree of sorting, sediment in January, April and August were poorly sorted but in November sediment was moderately sorted (Table 5.12). The occurrences the occurrence of fine sand in April at this probably drained water from shrimp culture pond during the harvest of shrimp. Some fine particular could escape from settle ponds or some shrimp farmers intended to released water directly into drainage canal. The fine particle as silt-clay was disappeared in the canal during rainy month August and early dry season of November which might due to the removing fine silt-clay and fine sand off the shore by freshwater runoffs but still settling of medium sand of high composition in the canal (Table 5.12).

Table 5.12 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station In of Transect B among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.4	Medium sand	1.70	Poorly sorted
April	3.3	Fine sand	1.48	Poorly sorted
August	2.4	Medium sand	1.39	Poorly sorted
November	2.6	Medium sand	0.88	Moderately sorted

b. Station 5 (St. TB5)

In January, medium sand seemed accompanied with silt-clay contributed 31.4% and 27% of sediment respectively. Coarse sand of various size shared small composition of less than 6%, Coarse sand was slightly increasing its composition of low content in January (0.1%) and changed upward to 6.1% in April while smaller size sand seemed aggregated of small fraction in composition. In rainy month August, the fine sand shared the highest composition about 38.6% while very fine sand and silt-clay content were in low composition of 16.7% and 12.3% respectively. Sediment type in the preceding November was changed to very fine sand about 77.2% of grain size composition while other classes of grain were shared lower composition than 7% except silt-clay sharing 15% (Figure 5.14).

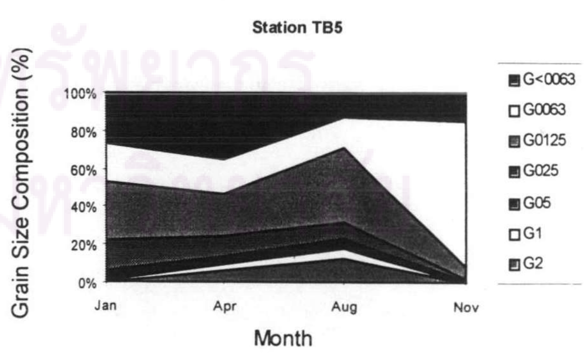


Figure 5.14 Grain size composition at Station 5 of Transect B among 4 sampling month: January, April, August and November.

Table 5.13 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 5 of Transect B among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.8	Medium sand	1.30	Poorly sorted
April	3.7	Fine sand	0.80	Moderately sorted
August	2.4	Medium sand	1.68	Poorly sorted
November	3.5	Fine sand	0.55	Moderately well sorted

Table 5.9 presented the measurement of median grain size, type of sediment, sorting index and degree of sorting description at this station. The results were showed that medium sand appeared in January and August while fine sand was found in April and November. There was considerably trend that sorting index was low in April (0.80ϕ as moderately sorted) and November (0.55ϕ as moderately well sorted). In January and August, northeastern wind and southwestern wind, could create wave action to the shore caused the removed fine particle such as silt and clay off the shore.

c. Station 4 (St. TB4)

The sediment composition in this station was characterized by very fine sand and silt-clay as shown in Figure 5.15. In January coarse particle of various classes were contributed less than 5% while very fine sand shared 8.3%. Very fine sand and silt-clay content were dominated the sediment being about 47.7% and 41.4% respectively. The silt and clay composition was slightly decreasing from April, August and November being 26.1, 15.3 and 5% respectively while very fine sand seemed dominating the bottom of increasing tendency from April, August and November of 31.2, 47.8 and 74% respectively. Fine sand occurred of small proportion in January, 7.1%, and the contribution slightly increase to 14.8, 16.5 and 8% in August and November respectively. Coarse particles of various classes were shared small composition less than 10% (Figure 5.15).

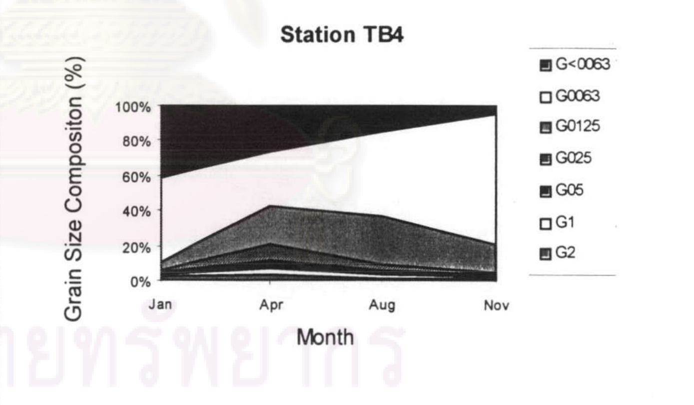


Figure 5.15 Grain size composition at Station 4 of Transect B among 4 sampling month: January, April, August and November.

For the examination of median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at this station was summarized in Table 5.14. The result showed that fine sand was dominant of this station sediment. It was obvious that very fine particle, particular silt and clay, appeared in January dominated the median grain size but its effect subsequently decreased in April, August and November. However, the small change in sediment composition occurred due to the increasing medium sand from April, August to November, after the seasonal South-West Monsoon.

Table 5.14 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 4 of Transect B among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.8	Fine sand	0.90	Moderately sorted
April	3.7	Fine sand	1.01	Poorly sorted
August	3.3	Fine sand	1.06	Poorly sorted
November	3.4	Fine sand	0.68	Moderately well sorted

c. Station 3 (St. TB3)

Grain size composition of this station among 4 sampling months was illustrated by area curves in Figure 5.16. The sediment type of this station was dominant by silt and clay particle and partly shared by very fine sand while various classes of coarse particle appeared lesser than 5% through sampling periods. Silt-clay composition was highest in January sharing about 65.2% of sediment and having small variation in April, August and November, namely 45.7, 56.5 and 39% respectively. Very fine sand contributed about 18.7% in January and slightly increased in April, 27% and showed small fluctuation in August and November 22.3% and 48% respectively. Fine sand contributed from 7.1 to 16.5%, highest in August while lowest in January.

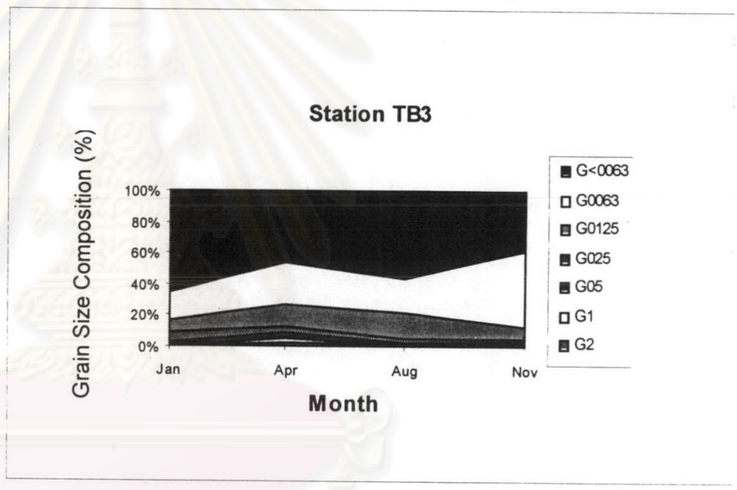


Figure 5.16 Grain size composition at Station 3 of Transect B among 4 sampling month: January, April, August and November.

To observe median grain size and type of sediment, the result shown in Table 5.15 were pointed out that this station was temporally characterized by fine sand and very fine sand. This could be explained by the sorting index of giving degree of sorting as poorly sorted to moderately sorted.

Table 5.15 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 3 of Transect B among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.3	Very fine sand	1.00	Poorly sorted
April	3.5	Fine sand	1.28	Poorly sorted
August	4.2	Very fine sand	0.86	Moderately sorted
November	3.4	Fine sand	0.96	Moderately sorted

d. Station 2 (St. TB2)

This station located at almost central part of the Bay. Grain size composition was illustrated by graph in Figure 5.17. The result was obvious shown highly composition of very fine sand and silt-clay. In January the composition of fine sand and silt-clay contributed 77.3 and 13.4% respectively while other classes of coarse sand had lower composition. For April the very fine sand composition was decreasing to about 38.7% while the composition of silt-clay was increasing to about 39.2% and fine sand was slightly shared upward to 15.7%. In August fine sand content was up again to 70.2% while silt-clay and fine sand were reduced to 20.8% and 6% respectively. The very fine sand composition slightly diminished to 35.5% in November while silt-clay fraction increased to the highest composition about 53.4%. This variation on silt-clay content might cause by wind actions of the North-East Monsoon affecting to sediment type in January and the South-West Monsoon to sediment type in August.

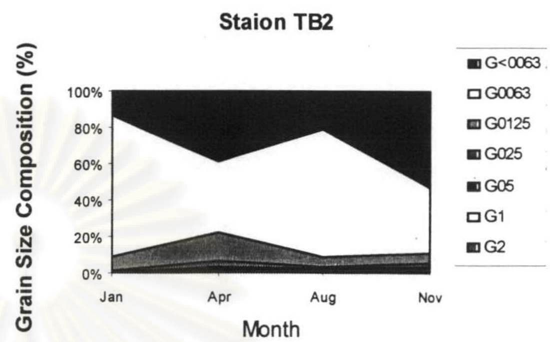


Figure 5.17 Grain size composition at Station 2 of Transect B among 4 sampling month: January, April, August and November.

Sediment characteristic of this station was major fine sand bottom (Table 5.16). There was an increasing trend of median grain size from January to November. The degree of sorting of sediment at this station was not completely homogenous type sediment.

Table 5.16 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 2 of Transect B among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.5	Fine sand	0.50	Moderately well sorted
April	3.7	Fine sand	0.98	Moderately sorted
August	3.9	Fine sand	0.65	Moderately well sorted
November	4.0	Very fine sand	0.88	Moderately sorted

e. Station 1 (St. TB1)

The grain size composition of this station was shown in Figure 5.18. In January, very fine sand was distinctly sharing the highest sediment composition at this station with the value of about 69.2%. Fine sand slightly diminished in April, August and November by contribution of 54.5, 46.6 and 21.3% respectively. Silt and clay formed secondary abundant class of sediment type. It appeared almost constant fraction from 19.6 to 32.8%, the lowest composition in November and the highest composition in April. There was a remarkably increase of fine grain size composition that it contributed only 0.6% in January with the trend increasing in April, August and sharply upward in November by value of 0.8, 2.2 and 4.7% respectively.

Sediment type of this station was majority of medium to fine sand with moderately and poorly sorted (Table 5.17). There was mixing of sediment of various type in January and November while fine sand occurred in April and August. The observation of highly fraction of medium sand was distinctive during the northeast monsoon period. It was clearly shown that the seasonal change was dominant effect for this station.

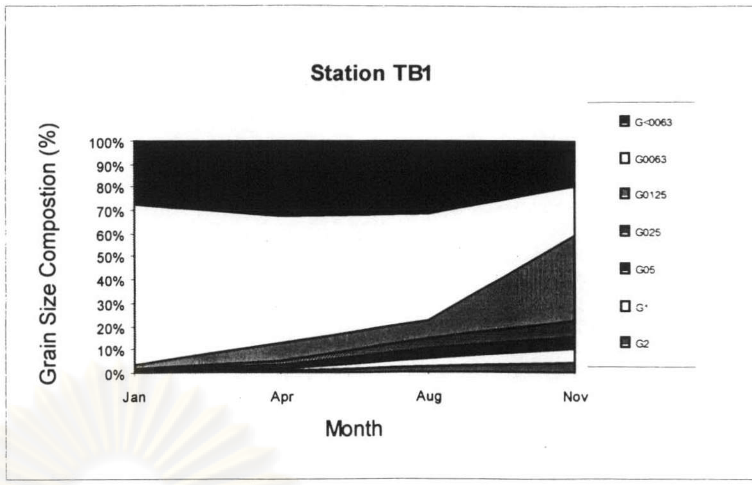


Figure 5.18 Grain size composition at Station 1 of Transect B among 4 sampling month: January, April, August and November.

Table 5.17 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 1 of Transect B among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.7	Medium to fine sand	0.80	Moderately sorted
April	3.2	Fine sand	1.59	Poorly sorted
August	3.8	Fine sand	1.25	Poorly sorted
November	2.7	Medium to fine sand	1.71	Poorly sorted

Transect C

a. Station In (St. TC In)

This transect lied along Klong Ta-Kuay at the northeastern part of the Bay. Grain size composition among sampling months: January, April, August and November was presented by Figure 5.19. Sediment types of this station composed of 3 major size classes, namely, fine sand, very fine sand and silt-clay. In January, medium sand (G0125) shared about 19.4% while fine sand and silt-clay contributed 38.6 and 36.3% respectively. Fine sand composition was increasing to 35% in April but very fine sand and silt-clay fractions decreased to 30.2 and 13.8% respectively. In August silt-clay fraction had highest portion about 42.6% while fine sand and very fine sand shared low fraction about 13.4 and 15.8% respectively. After the rainy month August, medium sand and fine sand fractions were increasing again sharing

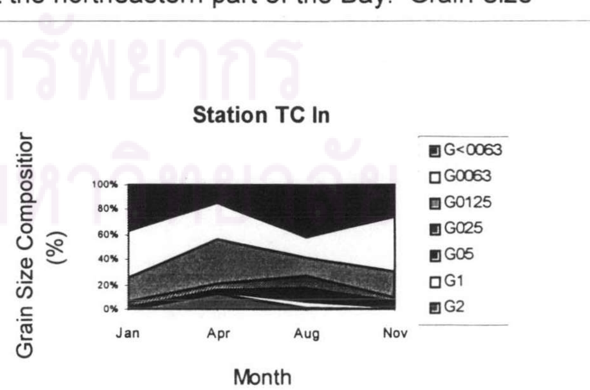


Figure 5.19 Grain size composition at Station In of Transect C among 4 sampling month: January, April, August and November.

20.5 and 43.2% in November respectively while silt-clay was removed from bottom and contributed only 26%. Other classes of coarse particle among 4 sampling months were varied seasonally.

Table 5.18 summarized the determination of median grain size, type of sediment, sorting index and degree of sorting. The result showed that this station sediment was obvious fine and very fine sand. Median grain size was varied from 3.3 to 4.6 ϕ those were described as fine particle of mud and sand. When considering to sorting degree, it was found that all samples from sampling months were most poorly sorted occupying a range sorting index between 0.90 to 1.65. This was suggested that there was probably impacted by some source of fine particle in neighboring area such as shrimp ponds and wave action.

Table 5.18 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station In of Transect C among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.5	Fine sand	0.90	Moderately sorted
April	3.3	Fine sand	1.53	Poorly sorted
August	4.6	Very fine sand	1.65	Poorly sorted
November	3.4	Fine sand	1.17	Poorly sorted

b. Station 5 (St. TC5)

This station located at the mouth of canal. Figure 5.20 presented an area curves for grain size composition of this station among 4 sampling months: January, April, August and November. The result showed high fraction of silt-clay, very fine sand and fine sand. In January, silt-clay fraction was highest composition of sediment at about 58.3% while very fine sand and fine sand had 32% and 8.7% contribution. In April, fine sand composition was increasing up to 24.3% while very fine sand and silt-clay fraction were decreasing to 22.1 and 30.6% respectively. For the rainy month of August, very fine sand and silt-clay slightly upward to 23.3 and 35.9% respectively while fine sand diminished from 21.6% to 5.2% for November. In November, very fine sand shared a highest composition of 58.9% while silt-clay shared only 30.1%.

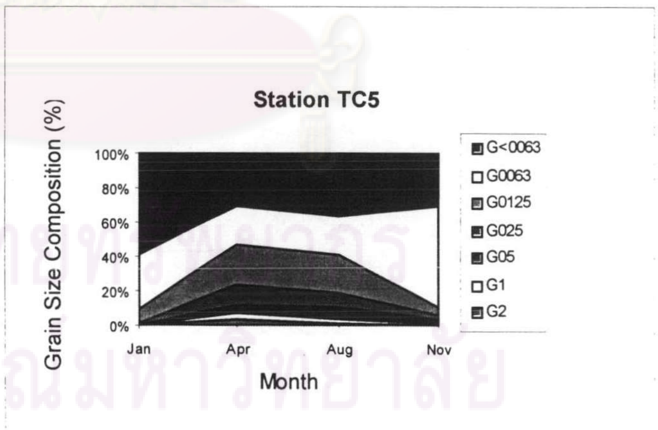


Figure 5.20 Grain size composition at Station 5 of Transect C among 4 sampling month: January, April, August and November.

Table 5.19 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 5 of Transect C among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.2	Very fine sand	0.80	Moderately sorted
April	3.7	Fine sand	1.01	Poorly sorted
August	3.4	Fine sand	1.40	Poorly sorted
November	3.7	Fine sand	0.79	Moderately sorted

Table 5.19 showed that this station was dominated by fine sand and mud, of the median grain size between 3.4 to 4.2 ϕ. But when considering to the sorting index, there was suggested that sediment at this station was moderately to poorly sorted. So, sediment of this station was heterogeneous and had highly variation due to seasonal change and impacted by other source of sediment. The moderately sorted sediment could be found in January and November but poorly sorted sediment was evident in April and August.

b. Station 4 (St. TC4)

This station located at sea-grass beds, *Halodule pinifolia*. The composition of sediment was illustrated by area curves in Figure 5.21. In this station, major sediment composed of fine particle likely sand and silt-clay fraction. In January, very fine sand and silt-clay composition were high about 47.2 and 39% respectively while other coarse particle size contributed lower than 10%. In the summer month April silt-clay fraction was distinctly increasing to 53.9% but decreasing for very fine sand down to 39.4% as well as a trend of coarse particle fractions. In the rainy month August, fine sand became distinct composition about 16.5% while very fine sand and silt-clay fraction slightly decreased. Fine sand sharply increased to 41% in November while very fine sand and silt-clay were obvious low composition about 26 and 2.7% in the same month. As well as coarse sand became more distinctive composition in November.

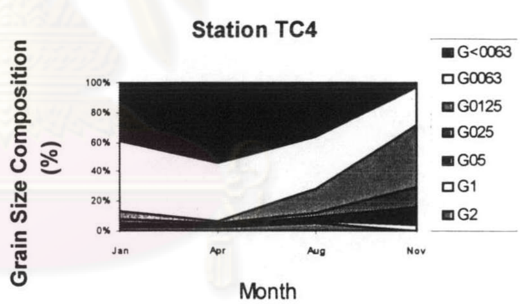


Figure 5.21 Grain size composition at Station 4 of Transect C among 4 sampling month: January, April, August and November.

Table 5.20 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 4 of Transect C among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.8	Fine sand	1.10	Poorly sorted
April	3.6	Fine sand	1.14	Poorly sorted
August	3.6	Fine sand	1.33	Poorly sorted
November	3.5	Fine sand	1.58	Poorly sorted

To determine type of sediment and degree of sorting, the median grain size of this station was varied from 3.5 ϕ to 3.8 ϕ indicated fine sand type sediment (Table 5.20). It was realized that the sea-grass *Halodule pinifolia* did prefer to inhabit this type of sediment. But the sorting index told that sediment type of this station was heterogeneous sediment composing of piece of broken shell and particular fine sand. During the winter and summer, the sediment was distinctly deposited of fine particle but became more coarser particle in rainy season August and intermediate month November. This period most of sea-grass beds were buried under sand forced by wave and wind action of South-West Monsoon.

g. Station 3 (St. TC3)

The result of grain size composition of this station was illustrated by area curves in Figure 5.22. It was obvious shown that sediment type of this station was composed of 2 major sediment type, namely, very fine sand and silt-clay. In January, fine sand composition was highest fraction about 61% and following by silt-clay fraction of about 31.3% while coarser particle size were contributed at lower composition. In April, medium sand slightly increased about 11% while very fine sand and silt-clay fraction had small diminished composition to be 54.6 and 27.2% respectively. For August, silt-clay fraction was increasing to a highest composition about 55.3% but very fine sand starting to decrease as well as medium sand. However fine sand and fine sand were found to be increasing in November while silt-clay composition was decreasing.

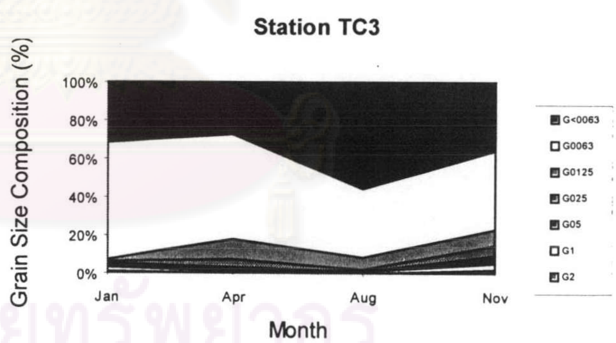


Figure 5.22 Grain size composition at Station 3 of Transect C among 4 sampling month: January, April, August and November.

Type of sediment of this station was mainly characterized by very fine to fine sand which median grain size ranging from 3.7 to 4.0 ϕ (Table 5.13), However this sediment was characterized of moderately sorted and poorly sorted that indicated the heterogeneous sediment for sediment type of this station.

Table 5.21 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 3 of Transect C among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.7	Fine sand	0.95	Moderately sorted
April	4.0	Very fine sand	1.10	Poorly sorted
August	4.0	Very fine sand	0.75	Moderately sorted
November	3.7	Fine sand	1.30	Poorly sorted

h. Station 2 (St. TC2)

The composition of grain size of this station was illustrated by area curves shown in Figure 5.23. The result showed distinctive area curves of very fine sand and silt-clay composition for this station. In January, it was found that very fine sand and silt-clay were major composition that contributed about 40.9 and 44.3% respectively while coarser grain size shared low composition. In April, very fine sand slightly increased to about 52.4% while silt-clay composition had small diminished fraction to 30.7%. In the rainy month August, very fine sand composition became very distinctive sharing a highest value 67.1% while silt-clay composition was continuous decreasing to 20.3% but for coarser grain size became slightly up particularly fine sand composition.

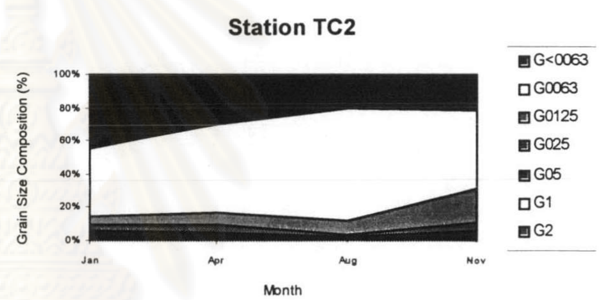


Figure 5.23 Grain size composition at Station 2 of Transect C among 4 sampling month: January, April, August and November.

Table 5.22 summarized median grain size, type of sediment, sorting index and degree of sorting for this station. It was found that median grain size of this station contributed in range of 3.3 to 3.8 ϕ which indicated the fine sand type of sediment to the area. Sorting degree of sediment were in range of 0.66 to 1.47 that were characterized of moderagely well sorted in August and poorly sorted in January, April and November. This finding could pointed out a main type of sediment at this station was fine sand with particular characterized of some mud and coarse sand of low content.

Table 5.22 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 2 of Transect C among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.8	Fine sand	1.00	Poorly sorted
April	3.3	Fine sand	1.47	Poorly sorted
August	3.6	Fine sand	0.66	Moderately well sorted
November	3.4	Fine sand	1.12	Poorly sorted

Transect D

a. Station In (St. TD In)

The result of grain size composition was presented by area curves in Figure 5.24. In January, the highest composition was silt-clay fraction shared about 37% and following by very fine sand contributed about 26.2%. Fine sand shared about 13.3% but each coarser particle size class had composition lower than 10%. Silt-clay fraction was sharply increasing in April to about 67.6% while very fine sand and medium sand were decreasing to about 16 and 8% respectively. For the rainy month August, fine sand slightly increased to 15% while silt-clay and very fine sand fractions decreased to 54 and 15.8% respectively. Other coarse particle size class were not distinctly different. The same trend occurred in November.

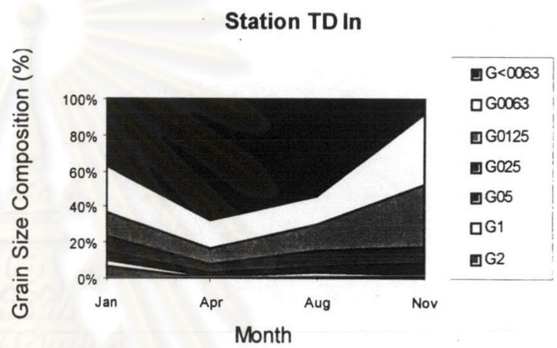


Figure 5.24 Grain size composition at Station In of Transect D among 4 sampling month: January, April, August and November.

Type of sediment was varied due to seasonal change and might be impacted by other source of fine sediment (Table 5.23). In January, median grain size indicated to be fine sand but poorly sorted but it became very fine sand characteristics in April and August which were moderately sorted and poorly sorted. Then, sediment type became fine sand again in November but very poorly sorted. It was concluded that sediment type of this station was fine sand mainly but there were mixed by other coarser grain that built up to be heterogeneous sediment to this station sediment. In April and August seemed to have higher content of silt and clay in the canal, which might be caused by water drained off from shrimp ponds which brought out some content of silt and clay to deposit in this drainage canal.

Table 5.23 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station In of Transect D among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.5	Fine sand	1.75	Poorly sorted
April	4.3	Very fine sand	0.96	Moderately sorted
August	4.2	Very fine sand	1.32	Poorly sorted
November	2.9	Fine sand	2.70	Very poorly sorted

b. Station 5 (St. TD5)

This station located at the mouth of canal. The result was presented as area curves in Figure 5.25. This station was having various size of grain and seemed to be heterogeneous sediment. In January, silt-clay fraction shared a highest composition about 31.9% and following by fine sand (G025-G0125) about 24.4% while coarse sand and fine sand contributed 14 and 18.7% respectively. Other coarser particle fraction shared low composition. In April, very fine sand slightly increased to about 25.5% while silt-clay and fine sand were decreasing. For the rainy month August, fine sand distinctly increasing its composition to be about 27.2% while the fractions of silt-clay, very fine sand and coarse sand had diminished content and the trend was continuous to November. In November, fine sand became the highest component about 37.6% while very fine sand and silt-clay contributed about 20.5 and 18.9% respectively.

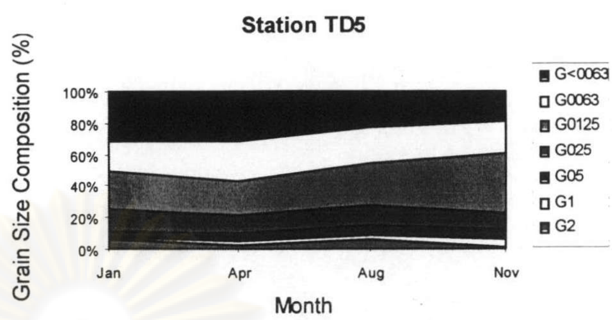


Figure 5.25 Grain size composition at Station 5 of Transect D among 4 sampling month: January, April, August and November.

Table 5.24 summarized the result of study on median grain size, type of sediment, sorting index and degree of sorting for this station. The result showed that sediment type found at this station was characterized by fine sand during the dry month of January and summer month April but the poorly sorted sediment indicated as heterogeneous sediment. Seasonal change in sediment was occurred when sediment type became coarser by increasing of medium grain size in the rainy month August and November.

Table 5.24 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 5 of Transect D among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.0	Fine sand	1.45	Poorly sorted
April	3.7	Fine sand	0.79	Moderately sorted
August	2.8	Medium sand	1.30	Poorly sorted
November	2.7	Medium sand	1.44	Poorly sorted

c. Station 4 (St. TD4)

Figure 5.26 presented grain size composition of this station by area curves. According to the graphs, the sediment type of this station was variety mixed of various size of sediment. In January, silt-clay fraction shared the highest composition about 29.7% and following by very fine sand, granule (G2) and fine sand fraction contributed about 19.3, 17.1 and 16% respecitively. Silt-clay composition became the highest fraction in April by sharing about 54.9% and the very fine sand composition was increasing to about 29.8% while each other coarser grain were diminishing. In August, fine sand composition was up to 31.2% while very fine sand composition was sharply decreasing to 8.2% but silt-clay was only slightly decreasing to 47.7%. In November, silt-clay was still existing in highest fraction of about 33.8% while very fine sand composition was up to 29.7% but fine sand was only 9% as well as other grain size class that never existed more than 10% composition.

Table 5.25 presented a summary of median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. The major sediment type of this station was fine sand. The sediment was characterized of heterogeneous sediment which was mixed of various size of grain particle causing poorly to very poorly sorted sediment for this station.

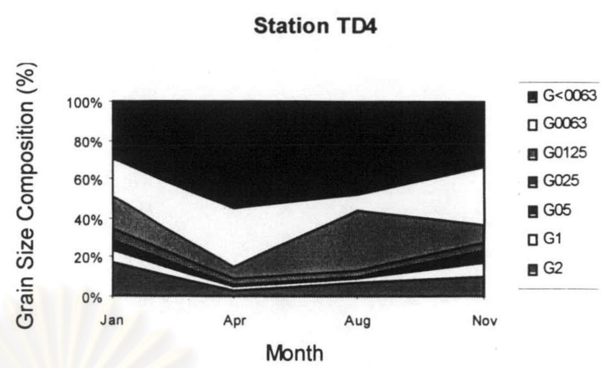


Figure 5.26 Grain size composition at Station 4 of Transect D among 4 sampling month: January, April, August and November.

Table 5.25 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 4 of Transect D among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.0	Fine sand	2.08	Very poorly sorted
April	3.7	Fine sand	1.12	Poorly sorted
August	3.6	Fine sand	1.41	Poorly sorted
November	3.4	Fine sand	1.93	Poorly sorted

d. Station 3 (St. TD3)

Figure 5.27 presented grain size composition by area curves for this station among 4 sampling months. From the result, this station sediment were composed of 2 major grain size, silt-clay and very fine sand. In the dry month of January, silt-clay fraction shared the highest composition about 65.7% while very fine sand had 21.4% of composition. Other grain size classes were below 5%. Fine sand composition was up to 47.3% in summer and dry month of April while silt-clay fraction was sharply decreasing to about 34.8%. For August, silt-clay composition was slightly up again by 42.6% as well as fine sand composition and granule sharing 15 and 8.6% respectively.

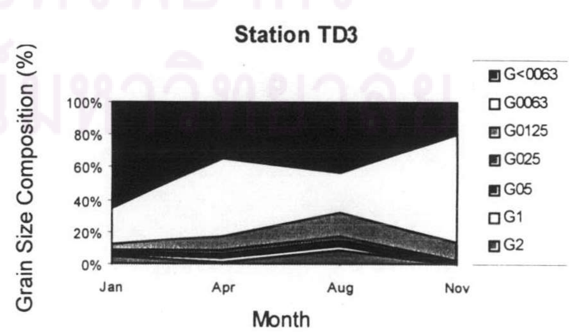


Figure 5.27 Grain size composition at Station 3 of Transect D among 4 sampling month: January, April, August and November.

Very fine sand composition was found decreasing to about 24.9% in August but it distinctly rise up to 66.7% in November while silt-clay and fine sand composition were dropped down to 20 and 11.1% respectively.

Table 5.26 summarized the study on median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. Median grain size contributed between 3.2 to 4.1ϕ that indicated the type of sediment in January, August and November were fine sand but in April was very fine sand. However the main grain particle size of this station was varied from very fine to fine sand. The texture of sediment was characterized of heterogeneous sediment because the sorting index indicated the poorly sorted for sediment in January, April and August but moderately sorted in November.

Table 5.26 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 3 of Transect D among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.2	Fine sand	1.30	Poorly sorted
April	4.1	Very fine sand	1.14	Poorly sorted
August	3.7	Fine sand	1.51	Poorly sorted
November	3.6	Fine sand	0.61	Moderately sorted

e. Station 2 (St. TD2)

Figure 5.28 presented grain size composition by area curves for this station among 4 sampling months. The result was obviously showed the highly composition of very fine sand in almost sampling months and following by silt-clay composition. In January, very fine sand shared the highest composition about 68.6% while silt-clay and fine sand composition occurred only 11.5 and 18.9% respectively. Other coarse grain were below 1%. In April, silt-clay fraction was increasing to about 31.1% but very fine sand and fine sand composition had small decreased in composition to 55.6 and 9.9% respectively. Fluctuation of sediment composition was occurred when very fine sand fraction and fine sand were up again to be 60% and 18.8% respectively while silt-clay fraction dropped to 16% but slightly up to be 38% in November. In November very fine sand and fine sand composition were diminished to 27 and 15.3% respectively.

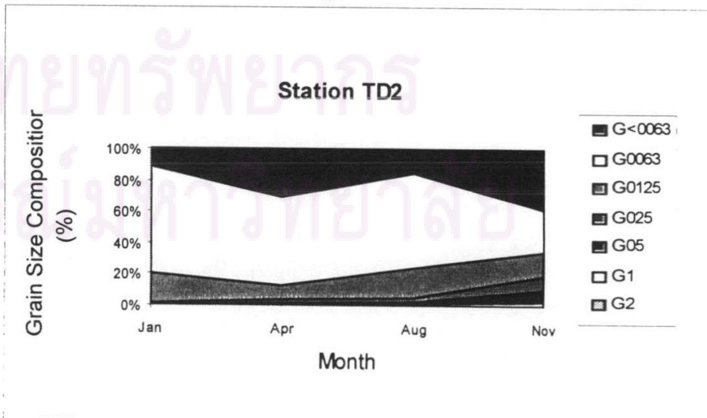


Figure 5.28 Grain size composition at Station 2 of Transect D among 4 sampling month: January, April, August and November.

Table 5.27 summarized result of median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. This station sediment was mainly built up by fine sand. The result of sorting index calculation indicated that sediment texture in January was moderately well sorted. That meant texture of sediment during dry month of January was characterized by homogeneous sediment.

For April and November the sediment were characterized of poorly sorted sediment or heterogeneous sediment but in August it seemed to be more homogeneous sediment with moderately sorted sediment.

Table 5.27 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 2 of Transect D among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.5	Fine sand	0.63	Moderately well sorted
April	3.3	Fine sand	1.54	Poorly sorted
August	3.4	Fine sand	0.76	Moderately sorted
November	3.5	Fine sand	1.40	Poorly sorted

Transect E

a. Station In (St. TE In)

The result of grain size composition of this station was presented in Figure 5.29. This station was composed of various type of sediment. In January, silt-clay had highest composition about 32.6% while very fine sand, fine sand and medium sand composition contributed 29.8, 23.6 and 8.9% respectively. In April, major grain size group obviously diminished while coarser sand were increasing. Very fine sand trended to increase in August, about 45.3%, while silt-clay, fine sand and medium sand dropped to about 19, 19.9 and 9.7%. In November, fine sand shared highest composition, 50%, and following by very fine sand, 31% but silt-clay appeared 5%.

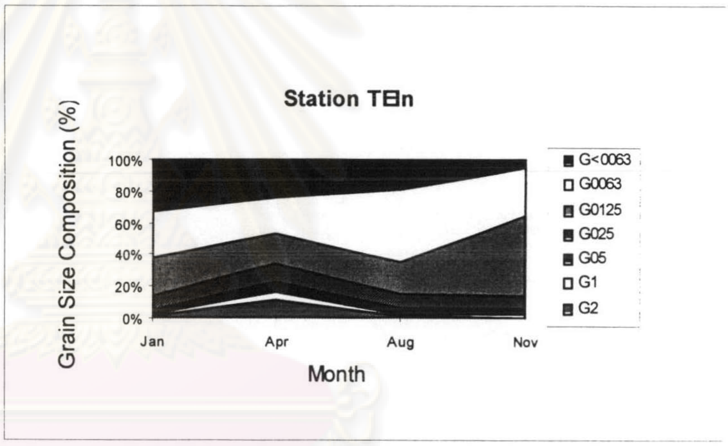


Figure 5.29 Grain size composition at Station In of Transect E among 4 sampling month: January, April, August and November.

When considering to median grain size, type of sediment, sorting index and degree of sorting as shown in Table 5.20. Median grain size contributed between 2.7 to 3.5ϕ that indicated the main composition were medium sand to fine sand. The sorting index were contributed poorly sorted to moderately sorted which could explain a heterogeneous sediment occurred in this station.

Table 5.28 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station In of Transect E among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.5	Fine sand	1.07	Poorly sorted
April	2.8	Medium sand	1.80	Poorly sorted
August	3.3	Fine sand	1.11	Poorly sorted
November	2.7	Medium sand	0.90	Moderately sorted

b. Station 5 (St. TE5)

The result of grain size composition was presented by area curves among 4 sampling months in Figure 5.30. It was found that in January silt-clay had highest composition about 36.1% and sharply increased in April about 52%. Very fine sand and fine sand shared about 29.7 and 17.7% in January but slightly decreased to 20.2% in April. The increasing trend occurred in August and November for very fine sand about 32 and 37% respectively. As well as fine sand was sharply rase up to about 40.3% for August and dropped to 30.6% for November.

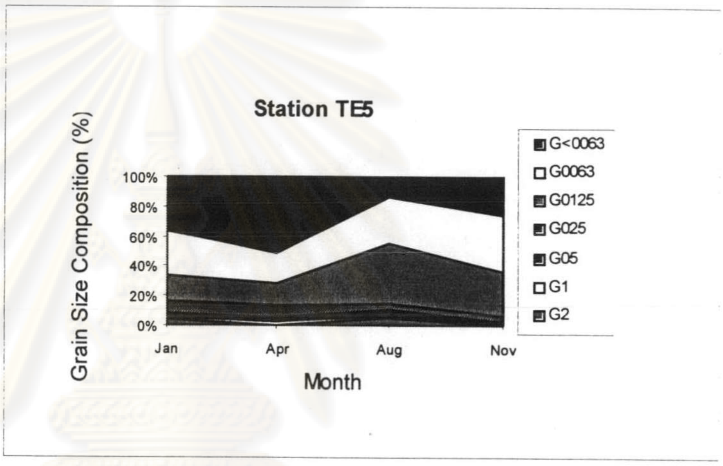


Figure 5.30 Grain size composition at Station 5 of Transect E among 4 sampling month: January, April, August and November.

Table 5.29 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 5 of Transect E among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.5	Fine sand	1.30	Poorly sorted
April	3.9	Fine sand	0.93	Moderately sorted
August	2.9	Medium sand	1.32	Poorly sorted
November	3.3	Fine sand	1.00	Poorly sorted

Table 5.29 summarized result on median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. Median grain size contributed between 2.9ϕ to 3.9ϕ being characterized of fine sand in January, April and November, and medium sand in August. The sorting index indicated the poorly sorted to moderately sorted sediment or heterogeneous sediment of this station. For sediment in August, type of sediment was medium sand while the fine particulate were removed off the area due to direct wind and wave action in South-West Monsoon season.

c. Station 4 (St. TE4)

The result of grain size composition for this station was illustrated by area curves among 4 sampling months as shown by Figure 5.31. In January, silt-clay fraction shared highest composition about 46.9% followed by very fine sand, fine sand and medium sand of about 27.4, 17.2 and 6.6% respectively. In April, silt-clay still kept highest composition about 47.5% while very fine sand and fine sand were slightly decreasing to 21.7 and 15%, respectively. For rainy month August, very fine sand and fine sand were increasing about 24.7 and 21.2% respectively while silt-clay and medium sand were slightly dropped to about 37.7 and 8.3% respectively. In November, only very fine sand and fine sand composition were up to 28.9% and 30% respectively while silt-clay was sharply dropped to 9.1%.

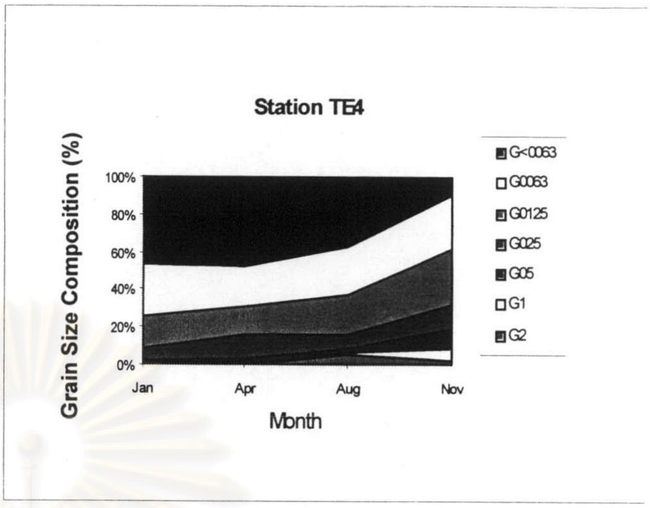


Figure 5.31 Grain size composition at Station 4 of Transect E among 4 sampling month: January, April, August and November.

Table 5.30 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 4 of Transect E among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.9	Fine sand	1.20	Poorly sorted
April	3.5	Fine sand	0.61	Moderately well sorted
August	3.6	Fine sand	1.20	Poorly sorted
November	2.5	Medium sand	1.35	Poorly sorted

Table 5.30 summarized result on median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. It was found that median grain size contributed between 2.5 to 3.9□ which was indicated fine sand for January, April and August while November was dominated by medium sand. However, the sorting index indicated poorly sorted for sediment in January, August and November while in April indicated moderately well sorted.

d. Station 3 (St. TE3)

Figure 5.3 presented grain size composition for station 3 among 4 sampling months. In January, silt-clay composition was highest sharing about 48% and following by very fine sand composition of about 32.5% while coarse grain contributed low composition. In April, very fine sand composition increased to

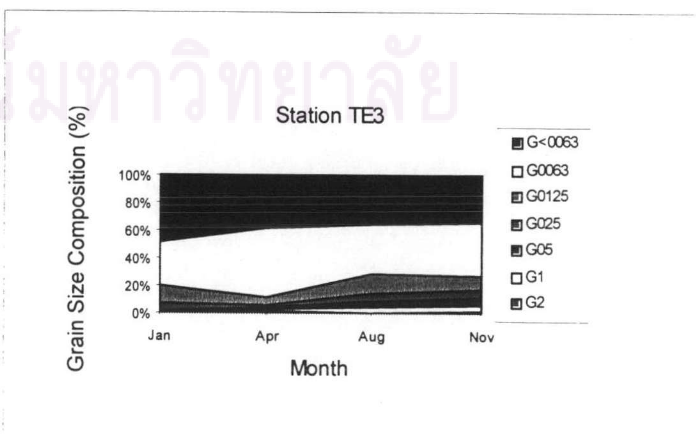


Figure 5.32Grain size composition at Station 3 of Transect E among 4 sampling month: January, April, August and November.

about 50.6% while silt-clay composition declined to 38.3%. The decreasing trend occurred for silt-clay fraction from August, 35.5%, to 34.1% in November. Very fine sand composition was varied from 35.8% in August to 39% in November. However, the fine sand composition had 14.9% in August and declined to 10% in November.

Table 5.31 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 3 of Transect E among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.0	Very fine sand	2.41	Very poorly sorted
April	3.8	Fine sand	0.85	Moderately sorted
August	3.6	Fine sand	1.28	Poorly sorted
November	3.5	Fine sand	1.47	Poorly sorted

Table 5.31 summarized result of median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. The median grain size contributed between 3.5ϕ and 4.0ϕ which indicated fine sand to very fine sand mainly shared in composition for this station. Sorting index indicated the sediment was heterogeneous sediment due to very poorly sorted to moderately sorted sediment.

e. Station 2 (St. TE2)

Grain size composition for Station 2 was presented by area curves among 4 sampling months as shown in Figure 5.33. The result showed high composition of very fine sand and silt-clay. For January, very fine sand had highest composition about 56.5% and following by silt-clay about 30.8% while coarser grain had low composition. In April, very fine sand shared very high composition about 71.7% while silt-clay composition was decreasing but slightly increasing in August and November, 30.5 and 32.3% respectively. In August, very fine sand composition was declined to about 37% and continuously decreasing to 35.7% in November while fine sand was slightly up to 13.5 and 13% for August and November respectively.

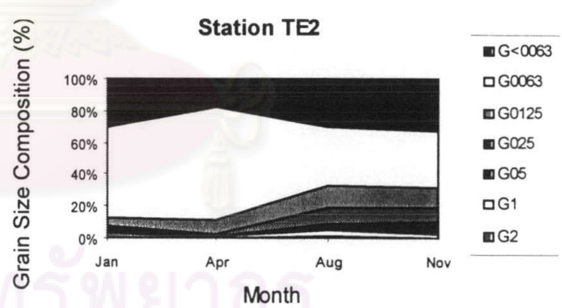


Figure 5.33 Grain size composition at Station 2 of Transect E among 4 sampling month: January, April, August and November.

Table 5.32 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 2 of Transect E among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	3.6	Fine sand	1.40	Poorly sorted
April	3.9	Fine sand	1.68	Poorly sorted
August	3.5	Fine sand	1.40	Poorly sorted
November	3.5	Fine sand	1.43	Poorly sorted

Table 5.32 summarized result of study on median grain size, type of sediment, sorting index and degree of sorting for this station among 4 sampling months. It was found that median grain size varied from 3.5ϕ to 3.9ϕ that indicated main type of sediment was fine sand. The sediment in this station was heterogeneous sediment which was indicated by poorly sorted sediment. The texture of sediment was built up of various size of grain size but major grain size was fine sand.

f. Station 1 (St. TE1)

The result of study on grain size composition for this station was presented by area curves among 4 sampling months in Figure 5.33. The result showed major type of sediment to be fine sand, namely, fine sand, very fine sand and silt-clay. Fine sand had highest composition about 37.9% and following by silt-clay, very fine sand and medium sand composition about 23.6, 14.2 and 12.4% respectively. Very fine sand and silt-clay tended to increase in April contributing about 36% while silt-clay shared 46.9% and 10.5% for fine sand. For August and November, fine sand was sharply increasing to 16.7 and 66.5% respectively while very fine sand and silt-clay contributed low composition (Figure 5.34).

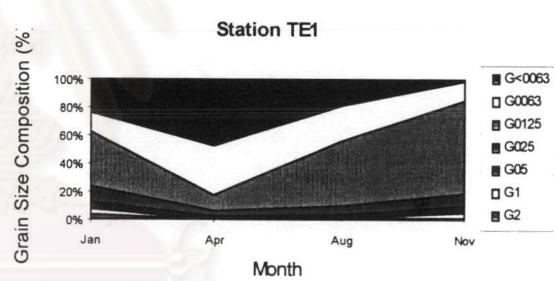


Figure 5.34 Grain size composition at Station 1 of Transect E among 4 sampling month: January, April, August and November.

Table 5.33 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at Station 1 of Transect E among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	2.7	Medium sand	1.53	Poorly sorted
April	4.1	Very fine sand	1.23	Poorly sorted
August	2.8	Medium sand	1.06	Poorly sorted
November	2.5	Medium sand	0.88	Moderately sorted

From Table 5.33, median grain size contributed from 2.5ϕ to 4.1ϕ that indicated the medium sand as the main type of sediment for this station. Sorting index were indicated mostly poorly sorted. It was evident that this station was formed as heterogeneous sediment where the sediment texture was mixing by various grain size classes.

Coastal Stations Outside the Bay

a. Station C1

The result of grain size composition for Station C1 was presented in Figure 5.3. The major composition was silt –clay (G<0.063) and very fine sand (G0.063). In January and April the silt-clay composition shared the highest composition about 67.1% and 67.2% respectively while the very fine sand shared 27.1% and 26.9% respectively. The silt-clay component slightly decreased to August and November. Very fine sand and medium sand (G0.25) tended to increase of 31.8% and 7.4% respectively in August and 42.2% and 15.7% respectively in November. This occurrence might be affected by the wind and wave action during the Southwestern monsoon. The other groups of grain size slightly increased after rainy period.

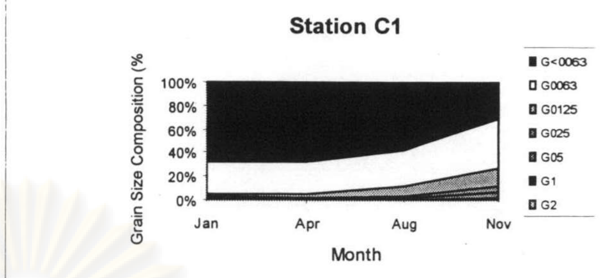


Figure 5.35 Grain size composition at control station C1 among 4 sampling month: January, April, August and November.

Type of sediment was mainly very fine sand during January to August of homogenous sediment but seasonally varied to coarser sand, fine sand, in November of poorly sorted sediment (Table 5.34).

Table 5.34 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at control station C1 among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.2	Very fine sand	0.68	Moderately well sorted
April	4.3	Very fine sand	0.71	Moderately well sorted
August	4.2	Very fine sand	0.86	Moderately sorted
November	3.5	Fine sand	1.17	Poorly sorted

b. Station C2

Figure 5.36 presented the result of grain size study from control Station 2 outside the bay. It showed that silt-clay was major composition in January, April and August about 51.4%, 49.4% and 40% respectively but decreased to 17% in November. Very fine sand (G0063) contributed 25.8% in January, slightly decreased in April (21.5%) but shifted upward to 35.5% in August and 49% in November while silt-clay decreasing. The rest grain size classes shared low composition besides fine sand (G125) was highest in November about 28.9%.

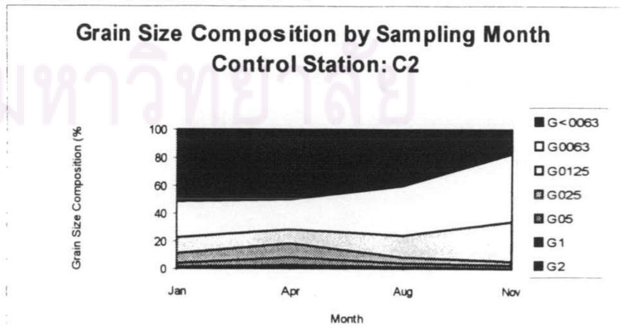


Figure 5.36 Grain size composition at control station C2 among 4 sampling month: January, April, August and November.

Sediment type of this station is dominant very fine sand but not homogenous sediment in January, April and August but became fine sand dominantly in November (Table 5.35).

Table 5.35 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at control station C2 among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.3	Very fine sand	0.70	Moderately well sorted
April	4.2	Very fine sand	0.71	Moderately sorted
August	4.2	Very fine sand	0.86	Moderately sorted
November	3.3	Fine sand	0.78	Moderately sorted

c. Station C3

This station site located on the south of the bay's entrance. Result of sediment study showed in Figure 5.37. Silt-clay (G <0063) formed major composition in all sampling months whereas very fine sand (G0063) shared less composition and the rest grain-size classes had small composition. In January, silt-clay contributed 48.3% slightly increased in April (49.4%), August (53.4%) and highest in November (72.6%) while very fine sand content showed a decreasing from January (24%) to April (21.5%) and lowest in August (11.8%) and slightly higher in November (22.4%).

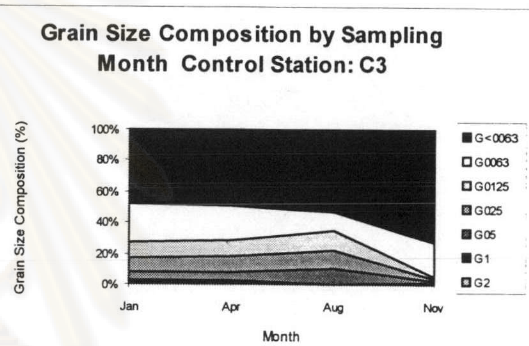


Figure 5.37 Grain size composition at control station C3 among 4 sampling month: January, April, August and November.

Sediment type is characterized of very fine sand during January, April and November with poorly sorted sediment. In August sediment type dominated by very fine sand with moderately sorted (Table 5.36).

Table 5.36 Median grain size, type of sediment, sorting index and degree of sorting of sediment analysis at control station C3 among the sampling months.

Sampling Month	Median Grain Size (phi value, ϕ)	Type of Sediment (Gray, 1981)	Inclusive Graphic Standard Deviation Index (Gray, 1981)	Degree of Sorting
January	4.1	Very fine sand	1.42	Poorly sorted
April	4.0	Very fine sand	1.40	Poorly sorted
August	3.8	Fine sand	1.47	Poorly sorted
November	4.3	Very fine sand	0.74	Moderately sorted

E. pH

The result showed that the mean average pH values ranging from 7.5 to 8.1 during the study period. The mean value in wet season was from 7.86 $\pm$ 0.09 to 7.93 $\pm$ 0.12 in the bay and 7.90 $\pm$ 0.05 in the coastal stations outside the bay. In dry season, mean pH value in the bay varied between 7.50 $\pm$ 0.19 to 8.05 $\pm$ 0.09 (Figure 5.38) while pH of the coastal stations outside the bay had an average of 8.15 $\pm$ 0.10 (Table 5.37).

In dry month of January, the mean average pH value was lowest at Station In, 5 and 4 and slightly increased at Station 3, 2 and 1. In warm and dry month April, pH was higher than in January that pH was lower that the previous month. In August a significantly high pH mean value was at stations close to shoreline where the trend showed slightly increased from Station In to Station 4. In the transition month November, the mean average pH curve was under 8.0 and seemed constant distribution for every sampling stations by ranging from pH 7.6 to 7.7 (Figure 5.39). All difference occurred between the mean average pH value of stations inside and outside the Bay. Mean average pH value was higher at control stations outside than mean average value inside the Bay in almost sampling months. The mean average value of outside stations in January, April, August and November were 8.1, 8.2, 8.17 and 9.63 respectively while the inside stations contributed 7.8, 7.83, 8.07 and 7.67 respectively.

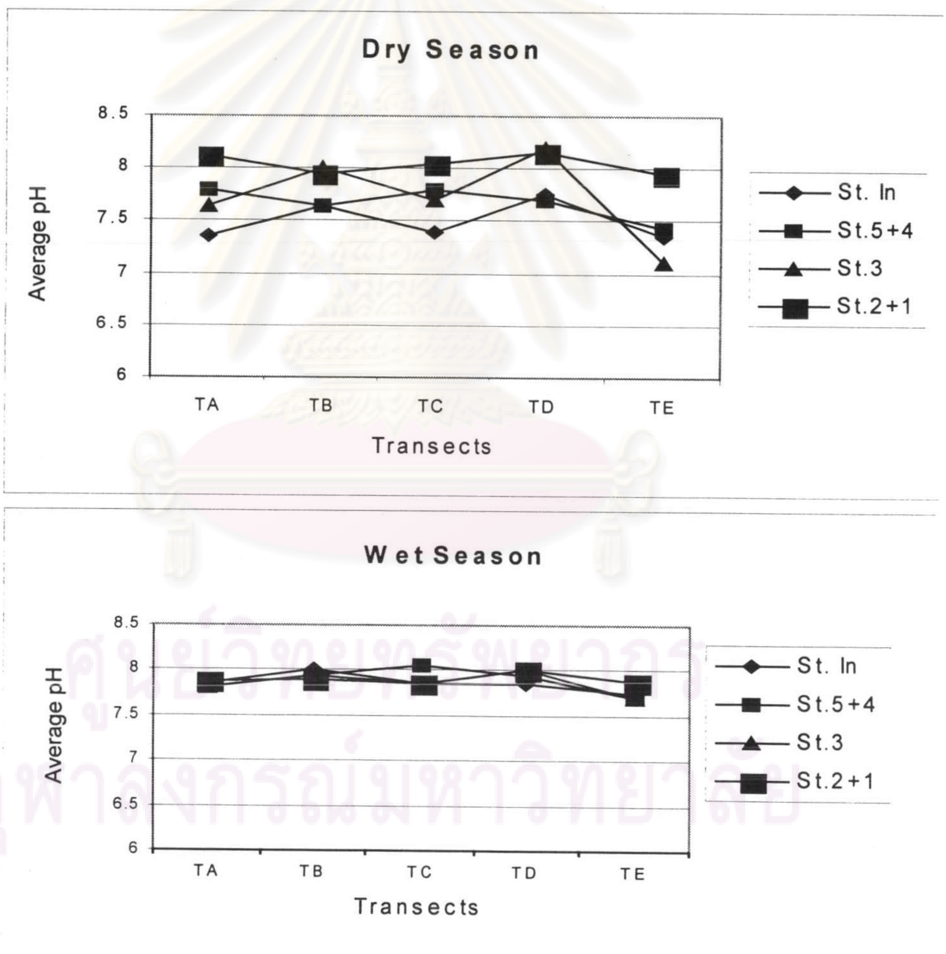


Figure 5.38 Mean average pH value by stations in 4 sampling months: January, April, August and November.

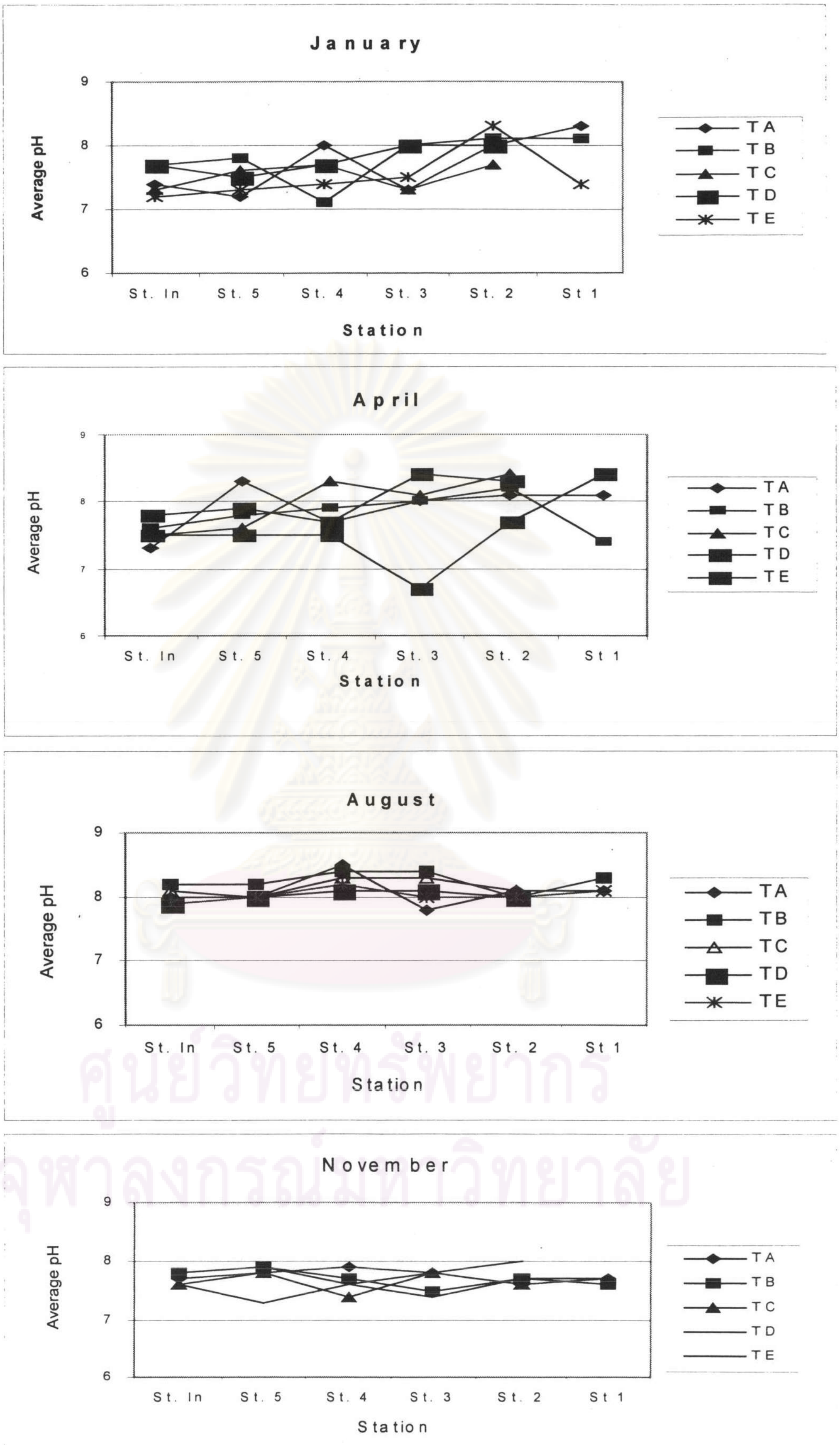


Figure 5.39 Average pH by stations in 4 sampling months: January, April, August and November 2000.

Table 5.37 Average pH on the coastal stations outside Kung Krabaen Bay during dry (January-April) and wet (August-November) season, 2000.

Coastal Stations	Dry Season	Wet Season
C1	8.05	7.85
C2	8.15	7.90
C2	8.25	7.95
Average	8.15	7.90
S.D.	0.1	0.05

F. **Hydrogen Sulfide**

The total hydrogen sulfide content was presented by a acidic volatile sulfide (AVS) measurement. The high value would be explained to have higher content of sulfide. The AVS value ranged from 0.08 $\pm$ 0.04 to 0.42 $\pm$ 0.11 mg/g in wet season. In dry season, the AVS was from 0.09 $\pm$ 0.08 to 0.88 $\pm$ 0.53 mg/g (Figure 5.39). This result indicated that higher AVS value along the inner stations during dry season where pH was also lowest. The AVS value of the coastal stations were 0.17 $\pm$ 0.11 and 0.12 $\pm$ 0.12 for wet and dry season (Table 5.38).

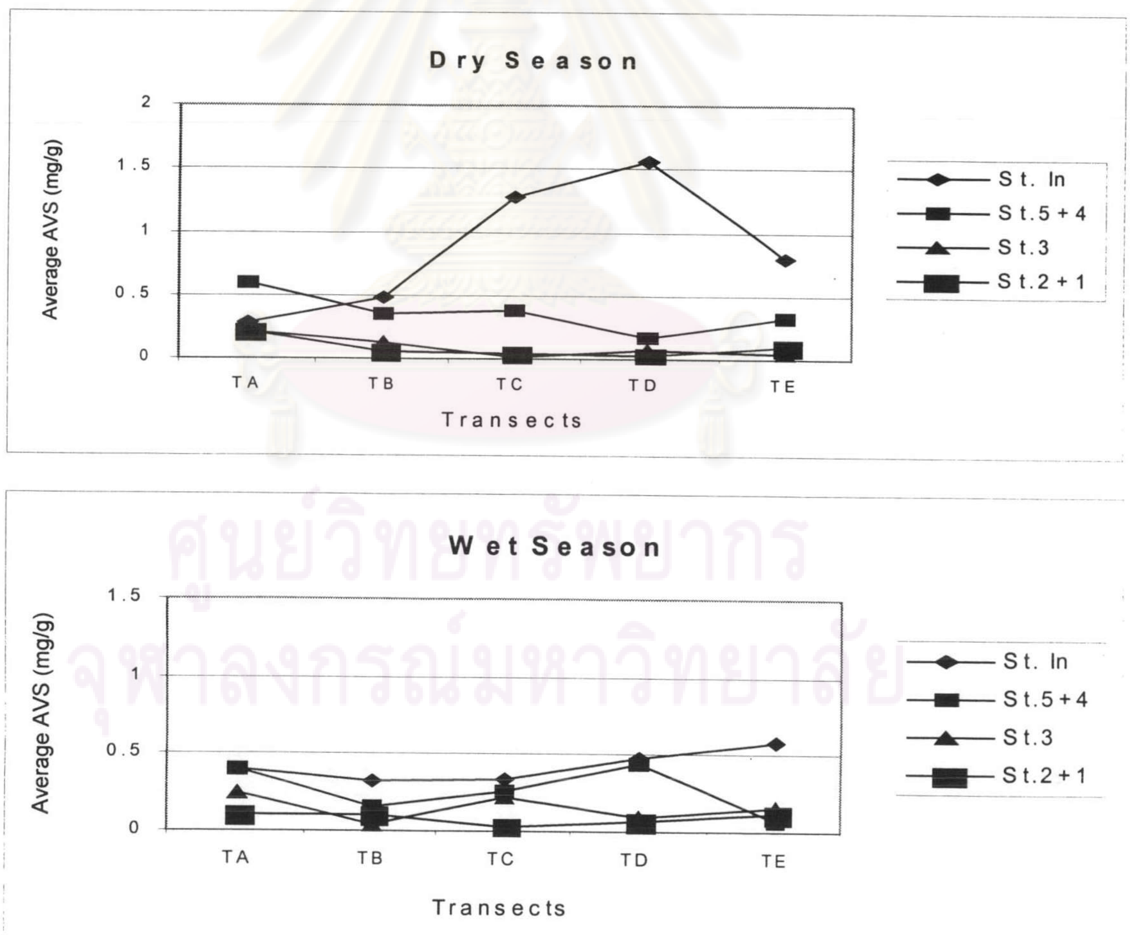


Figure 5.40 Mean average AVS (mg/g) transects in Kung Krabaen Bay during dry and wet season, 2000.

Table 5.38 Average salinity (psu) on the coastal stations outside Kung Krabaen Bay during dry (January-April) and wet (August-November) season, 2000.

Coastal Stations	Dry Season	Wet Season
C1	0.07	0.07
C2	0.05	0.15
C2	0.26	0.28
Average	0.12	0.17
S.D.	0.12	0.11

Hydrogen sulfide concentration was high at inner and at the mouth of drainage canals and also high in a few stations where related to the sea-grass beds inside the bay (Figure 5.41).

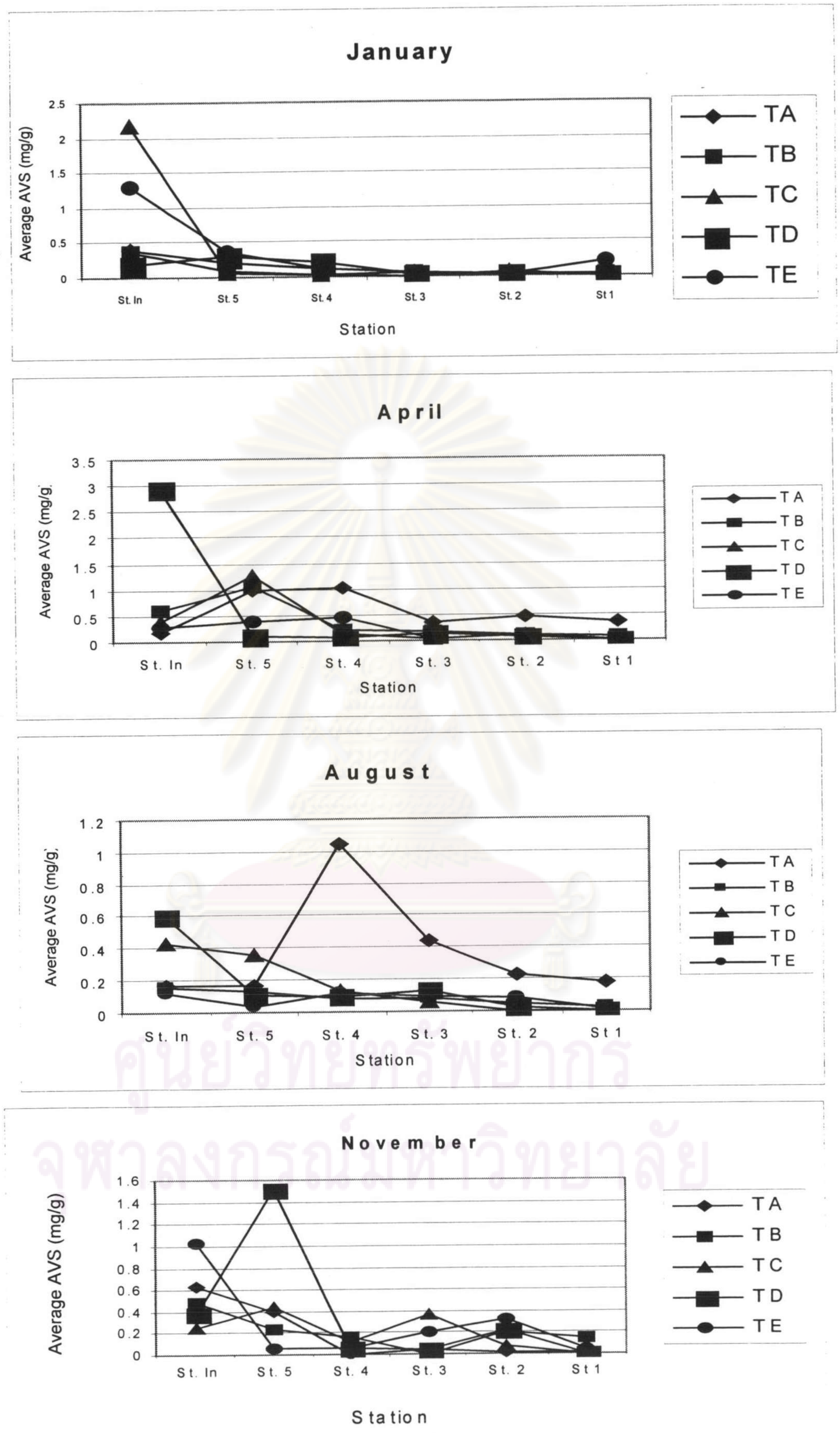


Figure 5.41 Average AVS (mg/g) by stations in 4 sampling months: January, April, August and November 2000.

G. **Organic Matter**

The organic matter of sediment was measured as percentage organic content. For overall result, the organic content contributed higher percentage at station inside the canal and at station at mouth of canal and the value decrease toward the bay mouth (Figure 5.42). In wet season, organic content varied between the mean values of 1.27% ± 1.02% to 3.91% ± 1.17%. The amount of organic material ranged from 1.03% ± 0.41% to 3.69% ± 0.98% in dry season. Sediment samples along TA seemed to contain more organic matter than sediment samples in the bay and outside the bay. The coastal stations outside the bay had low organic content comparing to the bay area (Table 5.39).

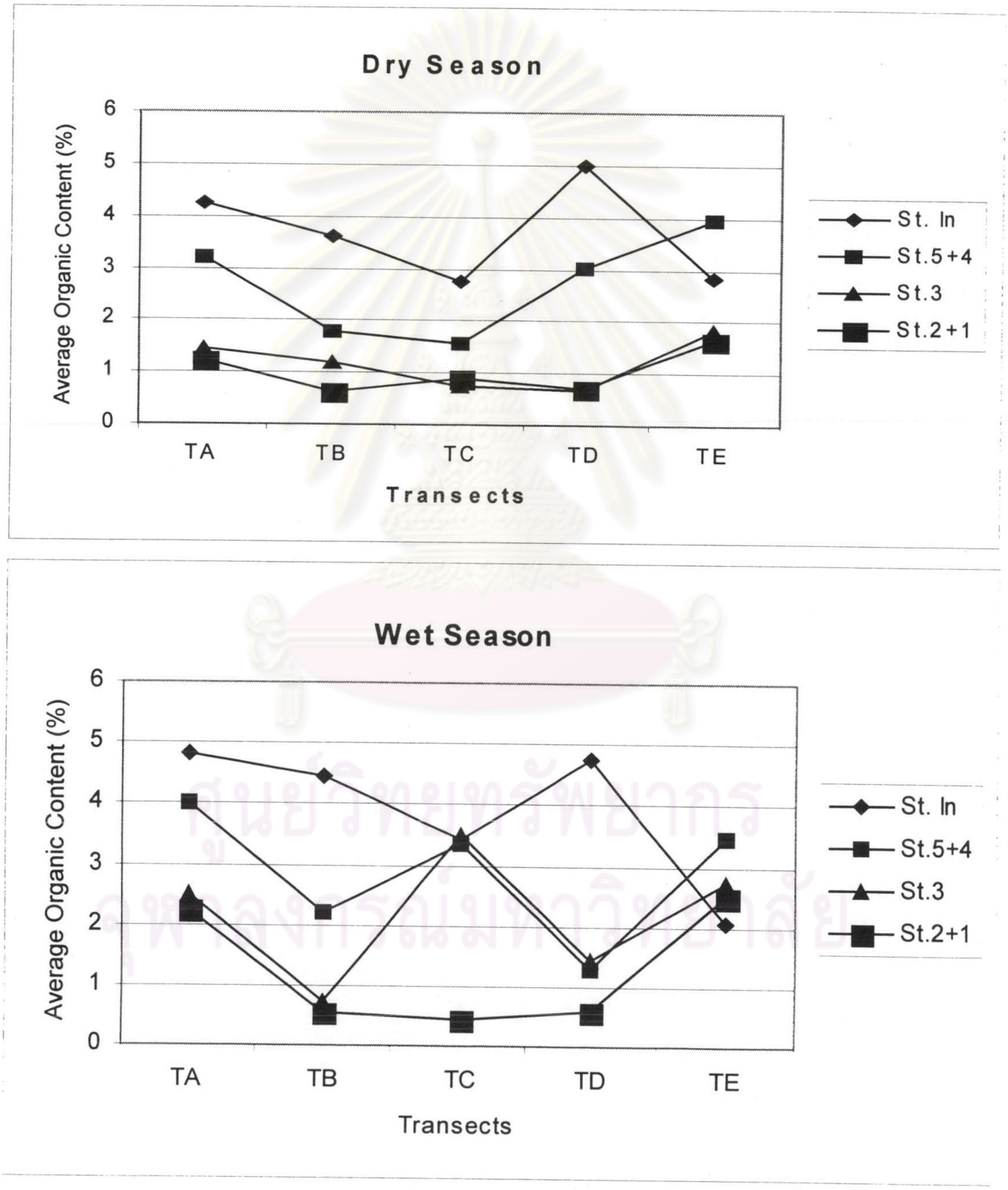


Figure 5.42 Mean average organic content (%) by transects in Kung Krabaen Bay during dry and wet season, 2000.

In January, the amount of organic matters in sediment varied upon both transects and sampling stations. Highest organic content from each transect was found in Station In (Figure 5.43). In January Station In had highest mean average organic matter about 5.116% and following by Station 5 about 4.235% while the rest stations contributed less than 2%. In summer month April, the mean average organic matter remarkably lower than the previous sampling month, January. It was found that the highest mean average organic matter was at Station 5 about 3.356% and following by Station In, 2.056% while the rest stations had less amount than 1.5%. Higher mean average organic matter appeared to increase in rainy month August. Station 5 had highest mean average organic matter, 3.752%, and following by Station In and Station 4, 3.006% and 2.327% respectively. The preceding stations had value less than 2%. For November, Station In had highest mean average organic matter, 4.806%, and following by Station 5, 3.807%. The preceding stations, namely, Station 4, 3, 2 and 1, contributed 1.584, 2.704, 1.447 and 1.32% respectively.

Average percentage of organic matter for the most stations of transect had widely variation of percentage value. There was obvious result that higher average percentage could be found to contribute at Station In and Station 5 in almost transects. Particular station in the central part of the Bay tended to have a higher value that might be caused by organic debris aggregated in patchy sea-grass beds which commonly found in this Bay. When considering mean average percentage of organic matter among transects, it did not show high significantly different but there was much different among stations close to shoreline and the group stations at the central part of the bay (Figure 5.43).

Table 5.39 Mean average organic content (%) on the coastal stations outside Kung Krabaen Bay during dry (January-April) and wet (August-November) season, 2000.

Coastal Stations	Dry Season	Wet Season
C1	0.37	1.05
C2	0.36	0.31
C2	0.83	2.19
Average	0.52	1.18
S.D.	0.27	0.95

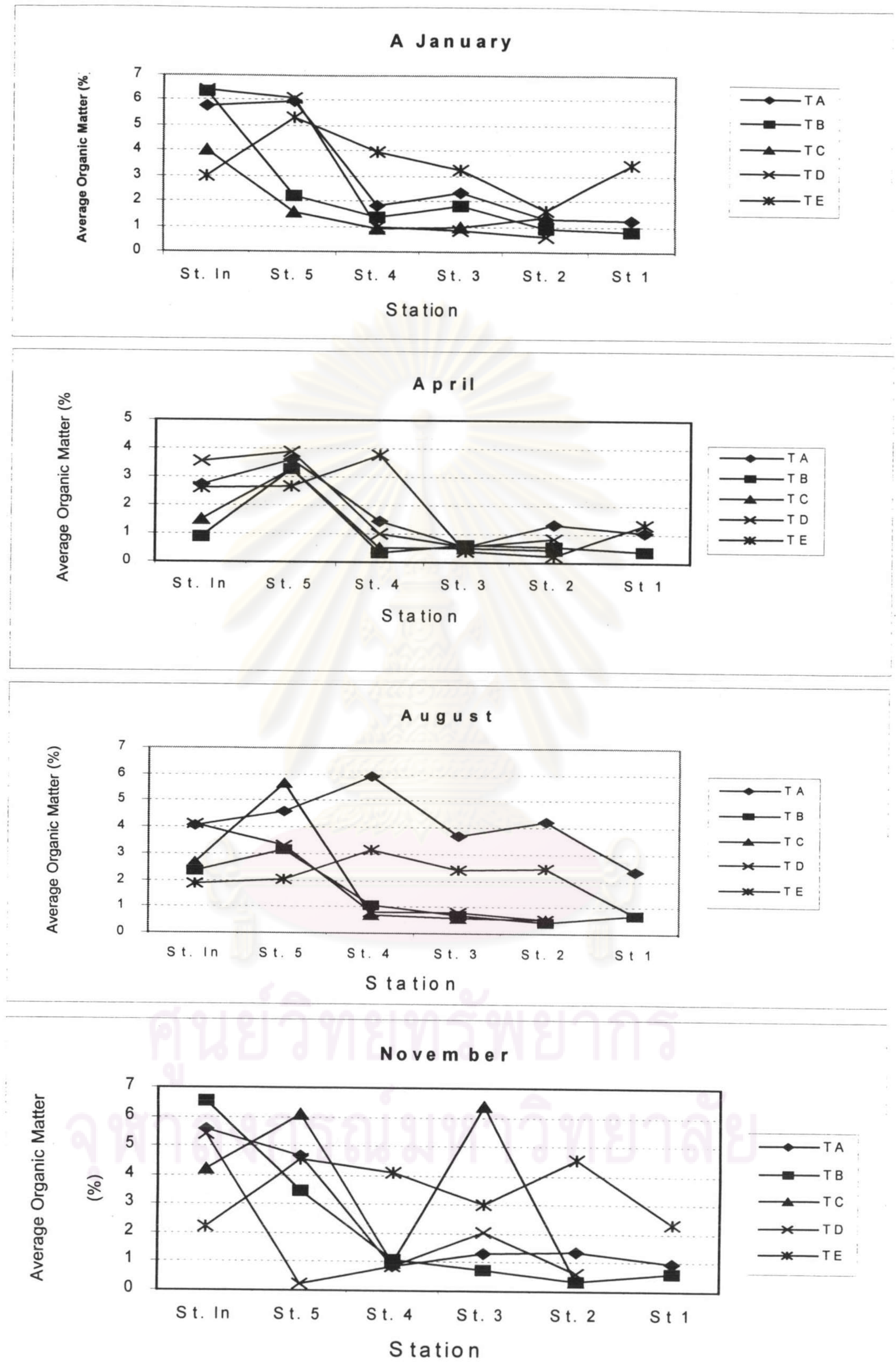


Figure 5.43 Average organic content (%) by stations in 4 sampling months: January, April, August and November 2000.

H. **Discussions and Conclusions**

Some physico-chemical properties namely temperature, dissolved oxygen, in the study sites were measured at bottom water, namely temperature and dissolved oxygen. These factors were determined through a period of every 3 months covering the seasonal change in the area. For overview discussion, it showed spatial and temporal change of those factors through out the study area.

Kung Krabaen Bay situates in the tropical zone where temperature change gains significantly indifferent through out the year. For example, the average temperature from this study varied in narrow range from 29.6°C to 32.2 °C. However, temperature plays an important role for chemical processes in the ecosystem and affects on dissolved oxygen concentrations in water and sediment. The result indicates slightly lower temperature in the canal and the higher inside the Bay area. This may due to the exposure to the sunlight. The mangrove trees can also protect area under theirs canopies from direct light from the sun.

Salinity in this area showed seasonally variation. Low salinity was found during the rainy season (August) and usually high during dry season (January, April and November). The lowest salinity about 2 psu (or ppt) occurs in the natural canals represented by Transect A and B, whereas the man-made canals had higher salinity about 15 psu. These man-made canals connect between the shrimp ponds and the bay, thus receive more saline water than the natural canals that receive runoff from other parts of watershed. This effect may cause the change in benthic community, particular the tolerance of polychaete species (Pearson & Rosenberge, 1978.

Oxygen contents during the study has never depleted to low concentration, the minimum concentration was higher than 4.0 mg/l. Oxygen is a key element in the metabolic processes of animals, i.e. fishes and invertebrates. Herreid, 1980 and Rosenberg, et al. 1991 (cited in Diaz & Rosenberg, 1995) suggested that the concentration of oxygen about 2 ml/l is significantly affected in the respiration in most marine invertebrates. Diaz & Rosenberg (1995) reviewed an oxygen depletion would alter community structure and function, and ecosystem flow. In addition, oxygen content copulating with temperature, sediment type, and organic matter in sediment can affect the thickness of RPD layer (Pearson & Rosenberg, 1978). For tropical area the RPD layer is found at a few millimeters below muddy bottom, particularly in mangrove sediment, whereas thicker layer of centimeters were found in sandy bottom (Limpsaichol, 1978). From this study the oxygen content was found averaging between 4.7 and 7.2 mg/l so the sediment never expose to hypoxia or anoxia condition (Diaz & Rosenberg, 1995).

Sediment type plays another limiting factor for benthic infauna (Rhoads, 1974; Gray, 1981). It is obviously clear that Kung Krabaen Bay basin is formed by slightly heterogeneous sediment pattern with mixing of various size of grained particle, mainly mud (silt-clay) and fine to very fine sand. Bottom sediment in the dredged canals (canals along Transect C, D and E) are moderately unstable with muddy sediment than the nature ones (canals along Transect A and B). The sediment type of overall area inside the bay were affected by seasonal change.

The result showed that pH in sediment was not significantly different among the sampling sites between inside and outside the canals. But there was a gradient of low pH in the canals and slightly increased toward the bay mouth. Bottom substrates of canals were dominated by mud. Such a type of sediment accumulated organic matter available to decomposition processes involve the utilization of available free oxygen, causing oxygen deficiency to environment. The muddy bottom always forms 3 distinctive layers vertically in the upper half meter of sediments. The upper surface is oxygenate layer of a few millimeters, the transition layer as called the redox potential discontinuous layer (RPD) and black layer of hydrogen sulfide mud without oxygen (Fenchel, 1969; Rutter, 1971; Limpsaichol, 1978). The formation of these layers are identical to pH in the tropical sediment particular in mangrove and sand bottom off mangrove area in Phuket Island (Limpsaichol, 1978). He suggested a profile of low pH value at higher depth and higher value at lower depth in mangrove sediment and slightly higher value about 8 in sandy bottom off mangrove, almost the same as that of seawater (pH=8.2). The greater amount of coarse sand can increase the thick of oxidized layer to sediment due to the effects of water turbulence, churning over of sediments and water percolation (Fenchel, 1969; Dale, 1974; Graetz, 1973; Wood, 1967, cited in Limpsaichol, 1978). It is now to conclude that the Kung Krabaen sediment is similar to tropical mangrove sediment with pH value between 7.5 and 8.5.

Hydrogen sulfide in sediment is usually produced from the chemical processes in decomposing the organic substanced in sediment carrying out by various microbial activities in anaerobic environment (Blackburn, et al.; 1975, Fenchel, 1969). The formation of H_2S is resulted from anaerobic bacteria utilize oxidized compound in the dead organic matter (Fenchel and Jansson, 1966, cited in Limpsaichol, 1978). The occurrence of H_2S is usually in relation to dissolved oxygen concentration. The H_2S is predominance when the oxygen concentration becomes deficient in environment under hypoxia condition (Diaz & Rosenberg, 1995). When hypoxia is initiated at the sediment or water surface interface, H_2S concentrations increase in the oxic sediments above the redox potential discontinuity (RPD) layer and may reach toxic concentrations for the infauna by the inhibition of the electron transport chain in aerobic respiration (Torrans & Clemens, 1982, cited in Diaz & Rosenberg, 1995). Vismann (1991) has reviewed the literatures on sulfide tolerance and states that increased tolerance maybe achieved by some different mechanisms: prevention of H_2S from entering the organisms, possession of an H_2S insensitive cytochrome-C oxidase, reliance on anaerobic metabolism and detoxification of H_2S by endosymbiotic suphide-oxidizing bacteria, and detoxification of H_2S in the animal tissues. Diaz & Rosenberg (1995) suggested the presence of sulphide in moderate to high concentrations combined with hypoxia appears to be more toxic than hypoxia alone after prolonged exposure. Concentrations of AVS from this study which were normally less than 300 mg/g together with sufficient dissolved oxygen during the day-time sampling did not indicate any hypoxia condition of the study area. It is obvious that the oxygen concentrations in this area are never dropped to hypoxia condition (< 2 mg/l) even inside the canals. The concentration of oxygen measurements were conducted during day-time at low tide, these concentrations inside the canals may decrease after sunset and the demands of oxygen for respiration increase so high that the deficiency of oxygen is initiated to hypoxia at the night period.

The organic material of this study exhibited higher contents in the drainage canals and at the mouth of canals but sometimes appeared far away from the canals, This may considerable to high accumulated organic material derived from sea-grass that distribute in the area. High content of organic matter inside the drainage canals is likely that illustrated by Hendrickx (1984), the richness in detritus up to 95% of zooplankton samples collected from a mangrove suspended in mangrove channel of Phuket Island. This organic particulate particularly caused by degradation of mangrove leaves by micro-organisms such as fungi and bacteria, and grazing animals including mei- and macrofauna in the habitat (Boonruang, 1978). The result showed a gradient distribution of organic matter which is similar to the previous result by Changrungruang (1997). Organic substances accumulated in bottom sediment can be decomposed by aerobic microbiologically activities in excess oxygenated condition. This organic matter is essentially food sources for deposit-feeders such some groups of polychaetes in relation to fine particle sizes (Sanders, 1958; Gray, 1981; Bianchi, 1988). Rhoads (1974) defined the conveyor-belt feeders as animals that ingest particles at depth and defecate on the sediment surface. They are common members of the benthic communities of undisturbed sediment. The deposit-feeding may be a mechanism to contribute an important bioadvectivel component to sediment mixing (Robbins, et all, 1979; Fisher, et al., 1980). High organic content may introduce the richness of deposit-feeders whereas too high organic substances or organic pollution from anthropogenic activities can completely diminish the number of species and abundance of benthic community and predominate of few opportunistic species to area (Pearson & Rosenberg, 1978; Shin & Koh, 1999; Tsutsumi & Kikuchi, 1983; Tsutsumi, 1995).