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WESTERN BASIN NEARSHORE, 1978-1979, PARTICULATES

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INTRODUCTION

The nearshore zone represents an important transition or mixing area between effluents from agricultural drainage, sewage treatment plants, urban runoff and industrial wastes and the open lake. These mixing zones, characterized by high concentrations of suspended sediment result in reduced light availability and lowered aesthetic quality. This report documents areas of the western basin nearshore with the highest concentrations of solids and determines their effect on light availability and plankton growth (chlorophyll).

Secchi transparency and turbidity measurements provide a general indication of the particulate material and light transparency within the water column. Information from total suspended solids can be sub divided into inorganic (residual solids) and organic (volatile solids) fractions. The chlorophyll a and POC values indicate plankton standing crop.

Tributary sources, resuspension, plankton patchiness, meteorological conditions (rainfall, snowfall, wind speed and direction) affect the distribution of particulates in the western basin nearshore. It was difficult in many cases to determine which variable or combination of variables was responsible for the resulting particulate distribution on a cruise by cruise basis.

The sampling schedule required 4 cruises during each sampling year (1978-1979). One cruise represented ice-out conditions or early spring. The remaining cruises were to be conducted in early summer, late summer and fall. Seventy-seven stations were sampled three times during each cruise. After a cursory data analysis, the stations were divided into seven reaches (Figure 1) to ease the presentation of data. To demonstrate the concentration difference between inshore and offshore stations, an inshore-offshore transect of stations perpendicular to shore has been selected (Table 2). Figures depicting couplets of adjacent inshore and offshore stations from the Detroit River Mouth to Huron, Ohio are presented (Figures 2-67).

RESULTS

Secchi

Consistently throughout the 2 year study, the reach with the lowest aesthetic quality and the lowest secchi disk transparency was the Maumee Bay Reach (#3). Values encountered here averaged from .25 m to .62 m on all 8 cruises (Tables 3 and 4). As expected, the clearest water encountered was for reach 7 (Sandusky Bay to Old Woman's Creek) which is at the eastern extreme of the Sandusky sub-basin. This region is at times influenced by central basin water masses.

Data from both years was similar, with 2 minor exceptions. An earlier spring sampling period for 1979 demonstrated the lowered secchi depths encountered when sampling spring runoff. The second anomaly was the result of a blue green algal bloom that occurred in August 1979 throughout the western basin. A surface bloom of pea soup consistency was found for reaches 5, 6, and 7 (Toussaint River to Old Woman's Creek). The other reaches had high concentrations of blue greens visible throughout the water column but did not demonstrate the surface phenomena.

On the average, the inshore secchi values were about 50% lower (less light penetration) than for those found in the offshore waters. The major exception to this occurred in Reach 6 (Sandusky Bay). The selection of the inshore and offshore portion for all reaches was based on distance from shore. The offshore areas of Sandusky Bay (stations 042, 050) however, reflect western basin water while the inshore areas (stations 041 and 048) represent central basin water unaffected by immediate sources. For example, station 041 is adjacent to a sand beach and station 048 is at the mouth of Old Woman Creek, which has a sand bar cutting off the creek from the lake.

The inshore reach means ranged from .2 to 1.80 meters with the lowest secchi value occurring at station 029 at the mouth of Muddy Creek in Sandusky Bay. The next lowest values occurred at stations in Maumee Bay. Annual offshore station means ranged from .7 to 2.2 meters, with the greatest water clarity observed in the easternmost portion of the study area, i.e., the Sandusky sub-basin. Couplet figures (Figure 2 - 13) demonstrating the differences between adjacent inshore and offshore stations are presented for every cruise. At least one couplet during each cruise showed an offshore station with lower secchi transparency than its respective inshore station. However, most often (6 out of 8 cruises), it was the couplet at the mouth of Sandusky Bay that showed this discrepancy. Once again, this is a figment of the inshore-offshore design. Station 039, although it is considered an offshore station (>7 km) from the mouth of Sandusky Bay, it receives the direct loading of the western basin more so than its selected inshore station 036, which lies to the west of the bay's mouth.

Extinction Depth

The extinction depth values, the depth at which 1% of the surface light remains, are assumed to represent the limit of the photic zone. Due to the high concentration of suspended solids in the western basin the average annual extinction depth found during 1978-1979 was 1.83 meters (Table 5). As expected, the shallowest extinction depths were found in Reach 3 (Maumee Bay) also relating to the low secchi values found there. The deepest light extinction was encountered in Reach 7 (Huron) as suggested from secchi depth data.

The ratio between inshore and offshore extinction depths (Table 6) by cruise varied between 40-62% throughout the year:

Cruise 1, '78	inshore 60% of offshore
2	48
3	48
4	54
Cruise 1, '79	40
2	50
3	61
4	62

The two year average inshore-offshore ratio of 52.5% was slightly lower than the 57.5% ratio found for secchi depth determinations.

Historically, the relationship of 1% extinction depth to secchi depth is about 4:1 (Brydges 1971). During this study, the 1% incident light level (extinction depth) was found to be 2.8 times greater than the associated secchi data. A different relationship was found between the inshore (2.4 + SE .14) and the offshore area (3.07 + S.E. .25). Atkins et.al. (1954) reported that the average depth of the euphotic zone is about 2.5 times the secchi depth. A critique of that paper by Nielson(1975) states that the 2.5 factor cannot be correct for all water types.

Plots of 1978 station averages of extinction data (Figures 14-19) show the offshore values constantly higher, with the exception of station 036 on 2 of the 4 cruises. The reasoning behind this exception was discussed in the secchi section.

Analysis of nearshore data has generated several questions:

1) Can the approximate 2 to 1 ratio of greater light penetration in the offshore zone be explained by a 50% lower suspended solids levels?

2) a) Is there additional information gained from the determination of both secchi depth and 1% extinction depth?

b) Would one expect the relationship between secchi depth and extinction depth be constant?

Turbidity

The reach with the highest average turbidity was Reach 4 (immediately to the east of Maumee Bay) in 1978 and Reach 7 (Sandusky Bay to Old Woman's Creek) in 1979. Cruise means ranged from 9.6 to 86.1 NTU's with the spring having the highest values during both years (Table 7). However, during the spring of 1979, turbidity values over 200% higher than those of 1978 were observed as a result of an earlier cruise schedule. Mention SNOWFALL LEVELS

The cruise 1,1979 inshore mean is skewed upwards as a result of one exceptionally high value in each of several reaches (Table 8). A 300% difference between inshore and offshore is seen as a result of these data points (300-1900 NTU's).

The couplet data (Figures 20 - 31) and the annual average plots for inshore and offshore stations initially look more oscillatory for the 1978 season than for 1979. This is a figment of the much larger scale needed for the occasional high spring values in 1979. Couplets of adjacent inshore and offshore stations on a cruise by cruise basis, show that the largest difference in turbidity is associated with river mouths (Figure 22 -cr 1,1978) and Figure 28 -cr 1,1979)

Total Suspended Solids

During the spring cruises of both 1978 and 1979, Reach 4 (Maumee Bay to the Toussaint River) provided the highest TSS concentrations of any reach (Table 9). This would seem to indicate that we missed the spring peak flow from the Maumee River both years or that resuspension of Maumee Bay sediments is the source of high solids. Reach 4 lies just to the east of Maumee Bay and the influence of the Maumee River, and has no other source for major sediment input. Throughout the rest of the year, reach concentrations vacillated from cruise to cruise, but all remained within the same range (5-70 mg/l). The lowest values of TSS occurred in Reach 7 (Sandusky Bay to Old Woman's Creek). On a seasonal basis, the highest TSS values generally occur during the springtime and the lowest values in late summer. The third cruise of 1979 is the exception to this general observation due to a basin wide blue-green algal bloom.

Inshore cruise mean concentrations ranged from 130 to 260 % times higher than offshore values. The mean inshore/offshore ratio is 2.1. (Table 10).

Observation of the inshore-offshore couplet (Figures 32 to 39) indicate that the stations consistently having the highest total suspended solids concentrations are stations 029, 021, 09 and 08.

Several points of interest can be made here.

1. The Maumee River contributes the greatest percentage of sediment to Lake Erie from tributary sources, although it only had the highest TSS concentrations on only one of the 8 cruises (station 02).

2. Two stations in Maumee Bay however did exhibit high TSS concentrations. One station (08) represented the outfall for Toledo Edison's Bayshore Power Plant and the other station was on the eastern extreme edge of Maumee Bay near Cedar Point, with no apparent point source for solids.

3. The station which consistently displayed the highest TSS concentrations was station 029 at the mouth of the Sandusky River and Muddy Creek at the entrance to Sandusky Bay. This station was also observed throughout the study as having the highest concentrations for both nutrients and chlorophylls.

4. The most unexpected result occurred at station 021, which lies at the mouth of the Toussaint River. This station exhibited the second highest TSS concentration during 5 out of 8 cruises. Boat traffic through the river channel is continually disturbing an adjacent sand bar. Another possible explanation for these high TSS values could be that bottom scour from the initial start-up of Davis Besse, which occurred in late 1977 with re-starts in 1978 and 1979, moves bottom sediments past this area. Eventually, bottom scour from the plant will decrease. However,if the high values are due to boat traffic, then high TSS concentrations will continue to be observed in this area.

Residual Solids

Data for Residual Suspended Solids (RS) is indicative of the amount of inorganic particulates in the water column. The highest average concentrations (38.2 - 77.7 mg/l) occurred during the spring cruises of both years, especially in Reaches 3 (Maumee Bay) and 4 (Maumee Bay to Toussaint River). As expected, the lowest RS values were observed in Reach 7 during summer 1978 and the summer and fall seasons of 1979 (2.6 - 7.9 mg/l). Although no figures are available to assist in the interpretation, one can look at the figures of percent volatile solids. High percent volatile solids (i.e., 60% organic) indicate low residual solids (i.e., 40% inorganic).

Data by cruise and reach can be seen in Table 11 and data for inshore-offshore comparisons in Table 12.

Volatile Solids

Seasonally, variation in cruise mean concentrations for the inshore and offshore was low. There was, however, less variation in the offshore concentrations than the inshore. The offshore cruise means ranged from 4.5 to 5.4 mg/l in 1978 and 3.9 to 8.0 mg/l in 1979. The inshore cruise means ranged from 6.0-9.4 mg/l in 1978 to 7.6 - 14.4 mg/l in 1979 (Table 13). Overall cruise means (all stations included) were observed to be higher in 1979 than 1978. Values from both the inshore and offshore subsets were found to be higher in 1979 on all cruises with the exception of the cruise 4, 1979, offshore which was slightly lower.

The ratio of inshore/offshore volatile solids concentrations averaged 1.6 over the two year period.

Spatially, Reach 4 had the highest concentrations of VS in the spring for both inshore and offshore areas. Reach 7 (Sandusky Bay to Old Woman's Creek) had the lowest volatile solids concentrations throughout the summer and fall. Most consistently throughout the year, Reach 3 (Maumee Bay) had the highest volatile solid values of any inshore reach (9.6 - 12.7 mg/l) and Reach 6 the highest of any offshore reach (8.0 - 10.9 mg/l).

Looking at inshore/offshore couplet Figures 40 to 47 indicates that the same stations that had high TSS values also have high VS values.

Percent Volatile Solids

When volatile solids data is analyzed as a percentage of total suspended solids, the highest percentages of VS are seen in the offshore areas. Higher actual concentrations of volatile solids can be found in the inshore reaches, but on a percent basis it is the offshore areas that have greater percentages of organic solids (23.6 - 58.0%) or plankton. The percent of volatile solids in the inshore ranges from 12.6 to 33.2%. The lowest percents of volatile solids during any cruise were observed during the spring season each year (Table 13).

Geographically, Reach 2 (Brest Bay to Maumee Bay) and Reach 1 (Detroit River to Brest Bay) had the highest percentage of volatile solids during the spring cruise of 1978 and 1979 respectively. Annually, the lowest inshore percentages were found at Reach 4 (19.1%) and Reach 1 (23.4%) for 1978 and 1979 respectively. The lowest annual offshore percent of volatile solids were also observed in Reach 1 during 1979 (Table 15). The highest offshore percentages were seen consistently in Reach 7 during both years (44.7% in 1978 and 48.5% in 1979).

Analysis of the inshore/offshore couplet values showed that during the spring the majority of high percents occurred at offshore stations. During the summer cruises of 1978, all couplets showed the percentage of volatile solids being greater in the offshore than the inshore area, while the summer cruises of 1979 had a mixture of inshore being greater than offshore, and offshores being greater than the adjacent inshore station. During the fall cruises of both years the same type of mixture of inshore and offshore maxima was seen as for the 2 summer cruises of 1979 (Figures 48 to 55).

Chlorophyll *a*

Chlorophyll *a* (Chl *a*) has traditionally been used as a measure of phytoplankton standing crop. Due to the relative ease in which Chl *a* is measured compared with the actual enumeration of phytoplankton biomass, Chl *a* is frequently measured. The enumeration and biomass estimation of phytoplankton is generally performed on select stations and depths and used as a reference in evaluating Chl *a* concentrations. Based on the interrelationships of Chl *a* to phytoplankton biomass together with particulate organic carbon, volatile solids and light data, attempts are made to evaluate the trophic status of aquatic ecosystems using Chl *a*. Consequently, Chl *a* has traditionally been a parameter used in routine water quality surveillance programs in Lake Erie. Prior to this investigation, measurements of Chl *a* have primarily been confined to open lake locations; thus previous evaluations of trophic status have not been taken into consideration in this extremely important transitional area.

The variation in chlorophyll concentrations shown over the two year study revealed that there was more variability geographically within each cruise than was encountered when comparing equivalent cruises between the two years (Tables 16 and 17). The reaches or regions designated as 3 and 6 (Maumee Bay and Sandusky Bay) consistently represented the areas with the highest mean chlorophyll concentrations along the U.S. western basin shore. Areas 7 (Sandusky Bay to Old Women's Creek) and 5 (Toussaint River) consistently were areas with the lowest concentrations, and area 7 represented the reach having the lowest concentration during 5 out of the 8 cruises conducted over the two years. The consistently low chlorophyll gradient found at reach 7 reflects open lake waters, which show a decrease in chlorophyll concentration in a west to east gradient. The remaining reaches 1, 2, and 4 all showed similar intermediate mean concentrations over the study period. However, significant variations were evident between each cruise interval. Much of the variability encountered in these three intermediate zones was due to changes in flow patterns resulting from varying meteorological conditions. For example, the direction of the Detroit River flow has a dramatic influence on both western shore reaches 1 and 2. Consequently, any change in the direction of Detroit River flow entering the western basin resulting from northerly or easterly winds may greatly alter the circulation pattern along the Michigan (western) shore and, subsequently, the distribution of chlorophyll *a* as it does for the other particulate parameters.

In all instances, the differences between chlorophyll concentrations recorded at the inshore vs offshore stations showed lower values at the offshore stations. Generally, the concentrations observed at the inshore locations were greater than 25% higher than concentrations at offshore stations (Table 17). The magnitude of the difference varied with cruise and specific reach, however the trend was very consistent (Figures 56 - 67). Due to the morphometry and sampling locations within Sandusky Bay (reach 6), no inshore-offshore comparison can be made. Differences found within the Bay can be attributed to influences, such as circulation, tributary inputs, and resuspension of bottom sediments.

Considering that nearshore zones can be extremely variable due to fluctuations in physical and chemical parameters, the chlorophyll concentrations in 1978 and 1979 were remarkably similar. The general seasonal trend had a two-fold increase in concentration from the early spring cruise (April) to the mid-summer cruise (July), then remained relatively stable through the last survey in October. This pattern of low spring chlorophyll concentrations , followed by a unimodal peak through the summer and early fall, is typical for the western basin (Fay 1975). Due to the lengthy interval between cruises, the normal short term oscillations in concentration were not observed. However, the consistency of the mean concentration through the summer and fall indicates that this sampling sequence provided enough information to yield an estimate of the seasonal concentrations within the nearshore zone.

It should be pointed out that the early spring chlorophyll concentrations do not represent the maximum concentrations attained during the year. The vernal diatom pulse may occur as early as late February or March just following ice-out conditions. During the nearshore study, the spring cruise did not take place until April, thus these concentrations represent values intermediate between the actual spring pulse and the established summer concentrations. Also, during the September cruise in 1979, bloom conditions were encountered along the entire shoreline, but most intensely in reaches 1, 2, 3, and 4. The highest chlorophyll concentrations of the study were encountered during this sampling period for all reaches both inshore and offshore, with the exception of Sandusky Bay where chlorophyll concentrations remained over 35 ug/l throughout the summer and fall.

The nearshore chlorophyll concentrations were from 3 to 4 times the concentrations generally encountered in the open waters of the western basin. Consequently, the entire nearshore zone represents a segment of the western basin that supports a higher standing crop than the open lake areas and thus can be considered (significantly) more eutrophic. Within the nearshore zone, two areas consistently were higher in concentration than other regions. As previously mentioned, the Maumee Bay and Sandusky

Bay regions both maintained a mean chlorophyll concentration above 30 ug/l during the summer and fall of both years. It is not to be inferred that other areas are not a problem, however regions 3 (Maumee Bay) and 6 (Sandusky Bay) consistently demonstrated the highest standing crop.

In conjunction with the high concentrations of chlorophyll found at reaches 3 and 6, plus the high concentrations found at the shore stations, nutrients (i.e., phosphorus and nitrogen both) were found to demonstrate the same relationship. That is, the concentration of these nutrients increases the closer to the shore or point source one takes the sample. Consequently, the nearshore zone represents an area of high nutrient availability and warmer temperatures. The major inhibitory factor, however, is light availability which frequently may be limiting due to the continual influx of eroded soil and resuspension from wave action of previously deposited materials. Maumee Bay and Sandusky Bay represent areas of high nutrient loading from both point and non-point sources. In addition, both reaches provide areas where water masses may become relatively quiescent for days at a time, allowing for the accumulation of algae within one area before mixing with adjoining water masses.

Total Organic Carbon

Total Organic Carbon (TOC) was calculated by adding the Dissolved Organic Carbon (DOC) and the Particulate Organic Carbon (POC) fractions. The average TOC concentration observed during 1978 was 4915 ug/l, with the highest concentrations occurring in Reach 3 (6488 ug/l). The lowest annual concentration (3662 ug/l) occurred in Reach 7 (Sandusky Bay to Old Woman's Creek).

On a seasonal basis, the lowest concentrations occurred during the spring (3816 ug/l) and increased to maximum levels during early summer (6080 ug/l). Concentrations then decreased during the late summer and fall cruises (4807 and 4958 ug/l respectively) (Table 18).

The inshore TOC concentrations exceeded those of the offshore by 138 % annually (Table 19). The greatest difference between inshore and offshore occurred in the spring (165%). The difference decreased through the remainder of the year (140%, 138% and finally 120%).

Particulate Organic Carbon

Particulate organic carbon (POC) distributions followed the same maxima and minima found for chlorophyll. The reach with the lowest POC concentration was reach 7 (Sandusky Bay to Old Women's Creek) and Reaches 3 and 6 had the highest POC levels, approximately two times those found in Reach 7 (Table 20).

The 1979 POC concentrations were 35 % higher than those observed in 1978. The values were higher in spring 1979 and remained higher. In contrast, the chlorophyll levels only reflected a 15 % higher increase in 1979. The fluctuation in seasonal POC concentration was lower than expected. Although a doubling of chlorophyll was observed between the spring and early summer cruise, this was not reflected in the carbon. Since the spring bloom was composed mostly of diatoms which have predominately siliceous walls, the spring POC may actually reflect detrital carbon.

As expected, the inshore values were generally greater than offshore POC levels, except for three reaches during cruise 4, 1978. The POC cruise offshore values range from 114 to 202 % higher than values for inshore areas. The lowest percentage (114%) was established during cruise 4, 1978, when 3 of the 7 reaches had greater inshore values or comparable inshore and offshore values. The highest percentage (202 %) was established during the spring of 1979 when the average inshore concentration was 4340 ug/l (Table 21).

Dissolved Organic Carbon

Due to the reduction in the number of Dissolved Organic Carbon (DOC) samples that were collected during 1979, only data for 1978 will be presented (Tables 22 and 23). The reach with the highest annual concentration (3561 ug/l) was Reach 3 (Maumee Bay). As expected, Reach 7 (Sandusky Bay to Old Women's Creek) had the lowest annual concentration (2388 ug/l), although on an individual cruise basis it did not produce the minimum values.

There is a noticeable west to east decreasing concentration trend with the highest concentrations in the southwest corner of the basin. A seasonal trend was observed for the 1978 data. The lowest cruise concentration was found for the spring (1960 ug/l), followed by an increase to maximum levels during the early summer (3491 ug/l) and dropping throughout the remaining two cruises.

An inshore-offshore comparison shows an annual ratio of 124 % greater DOC concentrations at inshore stations. The cruise averages ranged from 100 to 148 % greater DOC for inshore stations.

CONCLUSIONS

1. Two hundred percent greater light penetration found in the offshore zone can be explained by the approximately 50% lowered concentration of total suspended solids.

2a. A comparison was made of the relationship of the Total Suspended Solids (TSS), Chlorophyll (Chl), Turbidity and the Reciprocal of Secchi Depth (1/secchi)for the area with the highest concentrations (Reach 3, inshore) to the area generally with the lowest concentrations (Reach 7,offshore) to determine if the relationships were similar.
In a comparison between years, 1979 had generally higher concentrations for total suspended solids, turbidity and the reciprocal of secchi depth. Only chlorophyll remained fairly constant between the two years (Figures 69 and 69).
Reach 3 inshore concentrations showed a late summer minimum for total suspended solids, turbidity and the reciprocal of secchi depth for 1978, while in 1979, early summer, late summer and fall concentrations were all relatively low.
Chlorophyll demonstrated the reverse trend, reaching its maximum levels during the late summer cruise both years. The reciprocal of secchi reflected lower light penetration as a result of the surface blue-green algal bloom.
The chlorophyll did not increase throughout the water column as it did in the surface,thick blue-green algal layer (Figure 68).

2b. Reach 7 offshore data shows a good relationship between total suspended solids, turbidity and the reciprocal of secchi depth. The chlorophyll levels appear fairly consistent with the maxima occurring during the early summer cruise of 1978 and the late summer cruise of 1979 (Figure 69).

REFERENCES CITED

Atkins, W.R.G., Jenkins, P.G., and Warren, F.J., 1954. The Suspended Matter in Sea Water and its Seasonal Changes as Affecting the Visual Range of the Secchi Disc. J. Mar. Biol. Assoc. UK 33:497-509.

Brydges, T.G., 1971. Chlorophyll a - Total Phosphorus Relationships in Lake Erie. Internat. Assoc. Great Lakes Res. Proc. 14th Conf. on Great Lakes Res. pp 185-190.

Fay, L.A. 1975. An Investigation of Chlorophyll a in the Western and Central Basins of Lake Erie. The Ohio State University, Masters Thesis, 177 pages.

Nielson, E.S. 1975. Marine Photosynthesis: With Special Emphasis on the Ecological Aspects. Elsevier Oceanography Series # 13, pp 141. Elsevier Scientific: New York.

TABLES

TABLE 1. NEARSHORE REACHES AND STATIONS FOR WESTERN LAKE ERIE: MICHIGAN AND OHIO

Reach Number	Location	Nearshore (All Stations)
1	Detroit River to Brest Bay	M1 thru M11
2	Brest Bay to Maumee Bay	M11 thru M25
3	Maumee Bay	
	Inshore	M27, 01, 02, 03, 08, 09, 010
	Offshore	M23, M24, M25, M26, 04, 05, 06, 07, 011, 012, 013
4	Maumee Bay to Toussaint River	012 thru 021
5	Toussaint River to Sandusky Bay	021 thru 028
6	Sandusky Bay	
	Upper	029, 030, 031, 032
	Lower	032, 033, 034, 035, 037
	Lake	027, 028, 036, 038, 039, 040
7	Sandusky Bay to Old Woman Creek	040 thru 050

TABLE 2. WESTERN BASIN NEARSHORE INSHORE-OFFSHORE COUPLETS

Inshore Station	Offshore Station
M1	M3
M1	M6
M7	M9
M16	M15
M18	M21
M23	M25
M26	07
01	07
02	07
08	07
09	07
011	07
016	020
021	025
027	028
036	039
029	039
041	042
044	047
048	050

TABLE 3. WESTERN BASIN REACH MEANS FOR SECCHI DEPTH (m)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\overline{X}$	YEARLY $\overline{X}$
1	1978	$\overline{x}$	.87	.65	.40	.25	.34	.40	.50	.48	
		max	1.60	1.20	1.20	.40	.60	1.00	.80		
		min	.20	.30	.20	.10	.20	.10	.20		
2	1978	$\overline{x}$	.74	.76	.61	.68	.83	.80	1.40	.83	
		max	1.50	1.40	2.80	1.20	1.90	2.40	2.90		
		min	.20	.30	.20	.30	.30	.20	.40		
3	1978	$\overline{x}$	.91	.76	.62	.86	1.00	.80	1.52	.92	
		max	1.50	1.20	1.30	1.50	1.50	2.00	2.60		
		min	.40	.40	.30	.10	.40	.30	.50		
4	1978	$\overline{x}$	.48	.57	.55	.74	.78	.60	.55	.61	
		max	.90	.90	1.00	1.00	1.30	1.30	1.00		
		min	.20	.20	.20	.30	.30	.20	.30		
1	1979	$\overline{x}$	.57	.36	.25	.15	.20	.26	.28	.29	
		max	.90	.40	.40	.40	.50	.50	.50		
		min	.30	.30	.10	.10	.10	.00	.00		
2	1979	$\overline{x}$	.70	.79	.60	.86	1.21	.99	3.08	1.17	
		max	1.50	1.90	1.40	1.80	2.50	4.20	5.50		
		min	.10	.20	.20	.10	.10	.20	.50		
3	1979	$\overline{x}$	.57	.50	.40	.37	.53	.50	.79	.52	
		max	1.00	.90	.80	.80	1.00	1.00	1.00		
		min	1.00	.20	.10	.10	.10	.10	.20		
4	1979	$\overline{x}$	.66	.67	.49	.69	.73	.59	1.18	.71	
		max	1.20	1.50	1.10	1.30	1.00	1.40	1.50		
		min	.20	.20	.20	.30	.30	.10	.40		
	1978	$\overline{x}$	.75	.68	.54	.63	.73	.65	.99		.71
	1979	$\overline{x}$	.62	.58	.43	.51	.66	.58	1.30		.67

TABLE 4. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR SECCHI DEPTH (m)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	.60	.58	.35	.20	.29	.36	.45	.40	
		Offshore	1.25	.82	.68	.32	.42	.47	.51		.63
2	1978	Inshore	.55	.55	.43	.46	.60	.74	1.00	.61	
		Offshore	.93	1.01	.87	.88	1.41	.83	1.95		1.12
3	1978	Inshore	.70	.60	.50	.54	.84	.81	1.08	.72	
		Offshore	1.20	.94	.96	1.30	1.28	.77	2.13		1.22
4	1978	Inshore	.40	.48	.47	.58	.67	.58	.48	.52	
		Offshore	.61	.64	.69	.92	.98	.63	.60		1.14
1	1979	Inshore	.53	.36	.25	.14	.16	.24	.20	.26	
		Offshore	.80	----	----	.16	.28	.30	.38		.38
2	1979	Inshore	.51	.51	.44	.50	.74	1.07	1.80	.79	
		Offshore	.84	1.20	.92	1.26	2.20	.95	4.27		1.66
3	1979	Inshore	.46	.39	.28	.22	.39	.48	.69	.41	
		Offshore	.68	.66	.62	.60	.78	.50	.88		.67
4	1979	Inshore	.55	.55	.39	.52	.67	.56	1.00	.60	
		Offshore	.74	.82	.66	.88	.92	.57	1.33		.84
	1978	Inshore	.56	.55	.44	.45	.60	.62	.75	.56	
		Offshore	1.00	.85	.80	.86	1.02	.68	1.30		1.03
	1979	Inshore	.51	.45	.34	.34	.49	.58	.92	.52	
		Offshore	.76	.67	.55	.72	1.04	.58	1.71		.86

TABLE 5. WESTERN BASIN REACH MEANS FOR EXTINCTION DEPTH (m)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\bar{X}$	YEARLY $\bar{X}$
1	1978	$\bar{x}$	1.95	1.43	0.58	0.50	0.78	1.06	1.64	1.13	
		max	4.50	2.50	1.20	0.90	2.30	3.00	2.70		
		min	.50	.80	.10	.30	.50	.20	.30		
2	1978	$\bar{x}$	1.95	2.02	1.54	1.66	1.79	1.70	3.01	1.95	
		max	5.50	4.00	4.80	4.50	5.50	5.50	7.30		
		min	.40	.60	.20	.50	.60	.50	.50		
3	1978	$\bar{x}$	2.08	1.69	1.49	2.37	2.60	2.27	4.71	2.46	
		max	5.00	3.00	3.90	4.70	4.80	7.00	8.80		
		min	.80	.50	5.0	.50	.60	.50	1.10		
4	1978	$\bar{x}$	.96	1.28	1.30	2.14	2.03	1.52	1.29	1.50	
		max	2.00	3.00	3.00	5.00	4.00	3.50	2.40		
		min	.20	.20	.30	.60	.70	.50	.60		
1	1979	$\bar{x}$	2.03	2.08	1.07	.53	.54	.75	.72	1.10	
		max	4.90	6.20	5.60	1.60	.90	2.00	1.40		
		min	.60	.40	.20	.20	.20	.10	.00		
2	1979	$\bar{x}$	1.66	1.72	1.69	2.70	3.19	2.44	7.06	2.92	
		max	4.70	4.20	4.00	4.60	6.50	8.00	11.80		
		min	.20	.40	.50	.50	.50	.50	1.30		
3	1979	$\bar{x}$	1.58	1.24	1.09	1.19	1.53	1.38	2.19	1.46	
		max	3.30	2.30	2.30	2.20	2.70	2.70	3.50		
		min	.50	.60	.40	.50	.50	.20	1.10		
4	1979	$\bar{x}$	1.90	1.74	1.21	1.96	2.00	1.72	3.98	2.07	
		max	6.50	5.50	2.70	4.60	3.40	6.50	8.30		
		min	.50	.50	.40	.70	.80	.20	1.20		
	1978	$\bar{x}$	1.74	1.61	1.23	1.67	1.80	1.64	2.66		1.76
	1979	$\bar{x}$	1.79	1.70	1.27	1.59	1.82	1.57	3.49		1.89

TABLE 6. INSHORE-OFFSHORE WESTERN BASIN
REACH MEANS FOR EXTINCTION DEPTH (m)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	1.23	1.35	0.61	0.48	0.62	0.94	1.26	0.93	
		Offshore	3.58	1.73	0.83	0.53	1.13	1.20	1.88		1.55
2	1978	Inshore	1.11	1.18	1.01	1.15	1.28	1.58	2.35	1.38	
		Offshore	2.70	3.03	2.60	2.48	2.82	1.72	4.63		2.85
3	1978	Inshore	1.20	1.19	1.08	1.31	1.80	2.31	2.93	1.69	
		Offshore	2.98	2.08	2.80	3.60	4.03	2.19	6.80		3.49
4	1978	Inshore	0.57	0.91	0.94	1.33	1.43	1.47	1.14	1.11	
		Offshore	1.41	1.64	2.10	3.18	2.92	1.60	1.46		2.04
1	1979	Inshore	1.09	0.71	0.71	0.44	0.44	0.74	0.55	0.67	
		Offshore	2.57	3.39	2.50	0.83	0.67	0.78	0.93		1.67
2	1979	Inshore	1.27	1.88	1.28	1.74	1.93	2.57	3.96	2.09	
		Offshore	2.06	2.72	2.76	3.71	5.48	2.37	10.26		4.19
3	1979	Inshore	1.13	0.97	0.87	0.87	1.19	1.31	1.81	1.16	
		Offshore	1.96	1.59	1.70	1.80	2.12	1.41	2.71		1.89
4	1979	Inshore	1.16	1.32	0.92	1.31	1.59	1.67	3.13	1.59	
		Offshore	2.61	2.51	1.80	2.40	2.66	1.48	4.38		2.55
	1978	Inshore	1.03	1.56	0.91	1.07	1.28	1.58	1.92	1.28	
		Offshore	2.67	2.12	2.08	2.45	2.73	1.68	3.69		2.48
	1979	Inshore	1.16	1.22	0.95	1.09	1.29	1.57	2.36	1.38	
		Offshore	2.30	2.55	2.19	2.19	2.73	1.51	4.57		2.58

TABLE 7. WESTERN BASIN REACH MEANS
FOR TURBIDITY (NTU's)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\overline{X}$	YEARLY $\overline{X}$
1	1978	$\overline{x}$	14.4	18.8	49.4	79.3	52.8	31.9	29.2	39.4	
		max	90.0	89.0	100.0	100.0	110.0	122.0	110.0		
		min	3.0	5.0	5.0	38.0	38.0	10.0	8.0		
2	1978	$\overline{x}$	12.9	10.8	29.5	17.0	14.3	11.7	6.5	14.7	
		max	88.0	40.0	120.0	65.0	40.0	45.0	20.0		
		min	4.0	3.0	5.0	8.0	5.0	4.0	2.0		
3	1978	$\overline{x}$	6.0	8.9	12.9	8.7	7.3	14.5	9.0	9.6	
		max	27.0	60.0	30.0	27.0	23.0	70.0	140.0		
		min	3.0	4.0	4.0	3.0	3.0	4.0	3.0		
4	1978	$\overline{x}$	27.6	24.3	22.6	14.3	10.1	18.5	23.6	20.1	
		max	77.0	77.0	75.0	56.0	34.0	62.0	67.0		
		min	10.0	10.0	8.0	5.4	4.5	4.0	13.0		
1	1979	$\overline{x}$	16.9	25.6	83.8	130.7	85.9	96.4	163.0	86.1	
		max	50.0	83.0	310.0	320.0	270.0	1500.0	1900.0		
		min	5.0	4.0	6.0	18.0	33.0	19.0	24.0		
2	1979	$\overline{x}$	18.4	14.5	20.8	12.0	9.8	15.1	5.1	13.7	
		max	165.0	60.0	60.0	73.0	73.0	46.0	32.0		
		min	6.0	6.0	6.0	4.0	2.0	1.0	1.0		
3	1979	$\overline{x}$	15.8	17.2	23.0	25.7	20.1	19.6	11.8	19.0	
		max	56.0	46.0	68.0	68.0	64.0	83.0	29.0		
		min	6.0	8.0	8.0	8.0	4.0	4.0	6.0		
4	1979	$\overline{x}$	20.0	15.3	25.3	13.0	10.0	21.8	5.8	15.9	
		max	73.0	73.0	72.0	43.0	43.0	95.0	22.0		
		min	4.0	3.0	11.0	3.0	5.0	3.0	3.0		
	1978	$\overline{x}$	15.2	15.7	28.6	29.8	21.1	19.2	17.1		20.9
	1979	$\overline{x}$	17.8	18.1	38.2	45.4	31.5	38.2	46.4		33.7

TABLE 8. INSHORE-OFFSHORE WESTERN BASIN
REACH MEANS FOR TURBIDITY (NTU's)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	26.8	26.3	56.6	91.6	64.0	38.5	45.5	49.9	
		Offshore	6.2	13.7	26.5	62.0	40.6	24.8	20.4		27.7
2	1978	Inshore	21.2	16.6	32.3	28.1	17.8	12.3	8.3	19.5	
		Offshore	7.8	7.3	17.1	12.3	9.3	12.1	5.4		11.9
3	1978	Inshore	8.2	11.7	15.7	14.3	8.2	14.4	14.5	12.4	
		Offshore	4.2	7.9	8.2	5.6	6.6	16.5	4.6		7.7
4	1978	Inshore	40.3	34.8	28.3	25.5	13.7	18.3	29.9	27.3	
		Offshore	18.3	19.8	16.1	8.8	5.9	19.2	18.2		15.2
1	1979	Inshore	26.2	39.2	93.1	201.5	115.3	118.8	334.1	132.6	
		Offshore	8.4	16.5	25.6	53.0	54.0	70.5	39.0		38.1
2	1979	Inshore	28.2	22.3	28.1	24.5	15.8	15.3	7.5	20.2	
		Offshore	14.5	9.9	12.4	6.9	3.8	15.8	3.5		9.5
3	1979	Inshore	22.0	23.2	31.4	38.4	26.7	21.8	13.5	25.3	
		Offshore	13.8	13.0	12.8	12.6	10.8	17.7	10.1		13.0
4	1979	Inshore	26.0	23.0	33.3	22.5	13.0	22.6	7.9	21.2	
		Offshore	14.8	11.1	16.9	11.4	7.0	24.6	4.2		12.9
	1978	Inshore	24.1	22.4	33.2	39.9	25.9	20.9	24.6	27.3	
		Offshore	9.1	12.2	16.9	22.2	15.6	18.2	12.2		15.6
	1979	Inshore	25.6	26.9	46.5	71.7	42.7	44.6	90.8	49.8	
		Offshore	12.9	12.6	16.9	20.9	18.9	32.2	14.2		18.4

TABLE 9. WESTERN BASIN REACH MEANS FOR TOTAL SUSPENDED SOLIDS (mg/l)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\bar{X}$	YEARLY $\bar{X}$
1	1978	$\bar{x}$	27.2	31.6	63.4	83.2	43.5	37.0	33.6	45.6	
		max	108.5	105.3	148.6	120.3	101.1	164.5	143.0		
		min	5.2	12.7	12.7	34.7	18.8	14.0	10.8		
2	1978	$\bar{x}$	30.3	28.4	31.5	22.1	18.6	24.3	6.4	23.1	
		max	47.2	76.1	61.4	53.1	41.6	60.0	13.7		
		min	13.7	8.9	7.7	5.9	7.0	4.3	2.2		
3	1978	$\bar{x}$	8.5	12.6	20.4	29.4	19.9	18.6	5.6	16.4	
		max	18.4	28.3	42.5	94.3	94.3	47.4	12.8		
		min	4.0	5.8	7.8	5.4	5.5	4.6	2.7		
4	1978	$\bar{x}$	25.1	24.6	37.6	15.1	10.3	29.7	28.0	24.3	
		max	67.0	63.5	111.5	53.8	13.4	85.9	66.9		
		min	8.1	13.0	14.2	5.4	8.3	8.2	16.7		
1	1979	$\bar{x}$	25.2	41.7	88.6	154.2	134.3	55.1	151.6	92.9	
		max	72.1	96.6	179.0	398.6	241.9	121.2	767.4		
		min	5.8	5.4	8.4	25.3	9.4	13.9	28.4		
2	1979	$\bar{x}$	59.1	38.0	31.7	69.7	14.0	28.6	6.2	35.3	
		max	212.9	124.9	67.7	557.6	29.8	67.1	20.3		
		min	20.4	13.4	7.1	7.1	4.8	1.4	1.4		
3	1979	$\bar{x}$	45.6	32.0	35.6	24.1	18.7	28.4	12.5	28.1	
		max	118.4	63.3	72.2	39.6	39.6	105.0	17.6		
		min	13.3	16.2	13.6	13.6	9.9	9.9	5.6		
4	1979	$\bar{x}$	13.8	19.4	34.9	20.4	19.1	29.1	8.4	20.7	
		max	20.7	43.4	73.8	60.7	60.7	91.0	14.7		
		min	6.9	11.2	12.5	5.9	8.7	5.7	5.9		
	1978	$\bar{x}$	22.8	24.3	38.2	37.5	23.1	27.4	18.4		27.4
	1979	$\bar{x}$	35.9	32.8	47.7	67.1	46.5	35.3	9.03		44.3

TABLE 10. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR TOTAL SUSPENDED SOLIDS (mg/l)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	40.4	47.6	74.7	107.9	56.7	45.8	60.4	61.9	
		Offshore	8.1	15.5	27.2	71.2	33.9	25.1	13.7		27.8
2	1978	Inshore	40.0	45.2	44.6	34.6	22.3	26.5	9.3	31.8	
		Offshore	28.9	11.5	10.3	8.3	7.0	24.9	3.1		13.4
3	1978	Inshore	11.2	16.9	26.2	47.3	27.9	18.3	8.1	22.3	
		Offshore	4.4	8.6	8.9	7.9	6.3	21.0	3.5		8.7
4	1978	Inshore	29.4	23.6	46.7	21.7	11.4	30.0	35.2	28.3	
		Offshore	18.6	33.4	35.5	11.3	8.4	30.8	19.3		22.5
1	1979	Inshore	37.2	79.3	103.8	214.8	181.2	58.6	198.3	124.7	
		Offshore	11.1	8.0	14.9	61.5	79.6	55.1	163.3		56.2
2	1979	Inshore	80.9	53.9	43.4	20.1	18.9	28.8	10.0	36.6	
		Offshore	45.9	20.2	12.6	282.3	5.4	30.9	1.9		19.5 *
3	1979	Inshore	53.6	43.7	43.5	32.8	23.1	13.9	14.9	32.2	
		Offshore	49.5	19.2	15.1	14.0	10.6	22.7	10.9		20.3
4	1979	Inshore	16.8	24.0	43.4	32.4	25.1	28.4	10.3	25.8	
		Offshore	12.0	13.9	14.6	9.2	8.8	33.2	6.9		14.1
	1978	Inshore	30.3	33.3	47.9	52.9	29.6	30.2	28.25	36.1	
		Offshore	15.0	17.3	20.5	24.7	13.9	25.5	9.9		18.1
	1979	Inshore	47.1	50.2	58.5	75.0	62.1	32.4	58.4	54.8	
		Offshore	29.6	15.3	14.3	28.2	26.1	35.5	6.6		27.8

* Reach 4 $\overline{X}$ not included

TABLE 11. WESTERN BASIN REACH MEANS
FOR RESIDUAL SOLIDS (mg/l)

CRUISE	YEAR	X̄	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE X̄	OFFSHORE X̄
1	1978	Inshore	33.5	39.0	64.0	94.8	47.9	37.7	51.0	64.8	
		Offshore	5.3	10.8	21.1	62.3	27.9	18.8	10.6		22.4
2	1978	Inshore	28.0	32.8	33.2	26.3	18.3	16.8	6.0	23.0	
		Offshore	20.7	6.6	5.2	4.5	3.2	15.0	1.2		8.1
3	1978	Inshore	4.6	10.3	18.4	39.1	21.9	11.8	4.5	15.8	
		Offshore	1.2	3.9	4.4	3.6	2.7	12.1	0.9		4.1
4	1978	Inshore	23.3	16.9	38.0	16.7	7.9	23.4	29.6	22.3	
		Offshore	14.3	26.6	28.5	7.9	5.4	23.9	15.3		17.4
1	1979	Inshore	30.8	67.9	91.2	192.2	163.4	51.1	175.9	110.4	
		Offshore	8.3	6.1	11.8	53.3	56.3	47.3	45.2		32.6
2	1979	Inshore	65.1	36.9	30.4	14.8	13.5	15.7	6.1	26.1	
		Offshore	36.9	15.5	9.0	263.7	1.9	15.5	0.7		49.0
3	1979	Inshore	38.7	26.6	29.5	22.8	15.5	21.9	9.4	23.5	
		Offshore	39.4	11.9	7.8	7.9	5.7	12.1	7.2		13.1
4	1979	Inshore	11.9	15.4	32.2	21.9	17.6	20.4	7.6	18.1	
		Offshore	9.4	10.3	11.1	6.0	5.3	23.6	5.2		10.1
	1978	Inshore	22.4	24.8	38.4	44.2	24.0	22.4	22.8	28.4	
		Offshore	10.4	12.0	14.8	19.6	9.8	17.5	7.0		13.0
	1979	Inshore	36.6	36.7	45.9	62.9	52.5	27.3	49.8	44.5	
		Offshore	23.5	11.0	9.9	82.7	17.3	24.6	14.6		26.2

TABLE 12. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR RESIDUAL SOLIDS (mg/l)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\bar{X}$	YEARLY $\bar{X}$
1	1978	$\bar{x}$	21.9	25.0	53.8	72.8	36.1	29.7	27.8	38.2	
		max	93.5	90.6	135.9	105.7	87.1	141.3	125.0		
		min	2.9	8.0	8.0	29.3	13.9	10.4	8.3		
2	1978	$\bar{x}$	20.9	19.8	22.6	16.2	14.8	15.1	3.9	16.2	
		max	34.0	59.4	48.4	38.9	35.3	45.2	9.9		
		min	7.3	4.7	2.9	3.4	3.2	2.0	0.9		
3	1978	$\bar{x}$	3.2	6.6	13.8	23.4	14.8	11.4	2.6	10.8	
		max	7.8	22.0	33.7	80.4	80.4	32.2	7.6		
		min	0.8	1.9	3.6	2.6	2.4	1.8	0.6		
4	1978	$\bar{x}$	19.6	17.8	30.0	11.1	6.9	23.0	23.2	18.8	
		max	56.8	51.9	98.5	45.8	9.2	71.8	58.6		
		min	5.6	8.8	8.7	3.1	5.3	5.3	13.1		
1	1979	$\bar{x}$	20.5	35.0	77.7	137.2	117.2	47.5	108.5	77.7	
		max	62.5	84.8	161.1	360.0	221.4	106.9	686.6		
		min	4.1	4.1	6.5	20.4	8.3	12.5	22.8		
2	1979	$\bar{x}$	47.1	26.8	22.2	62.4	9.4	15.2	3.5	26.7	
		max	185.6	105.0	52.6	523.0	21.7	43.5	15.9		
		min	15.3	5.1	4.5	4.5	1.5	2.2	0.3		
3	1979	$\bar{x}$	33.7	19.4	23.8	16.4	12.2	17.4	7.9	18.7	
		max	99.8	46.3	62.2	30.1	30.1	83.5	12.8		
		min	8.0	7.4	6.4	6.4	5.0	5.0	1.7		
4	1979	$\bar{x}$	10.2	15.8	26.2	13.3	12.9	20.9	6.3	15.1	
		max	15.3	29.9	63.3	46.8	46.8	7.5	11.9		
		min	5.5	7.5	7.6	3.2	4.7	3.5	4.5		
	1978	$\bar{x}$	16.4	17.3	30.1	30.9	18.2	19.8	14.4		21.0
	1979	$\bar{x}$	27.9	24.3	37.5	57.3	37.9	25.3	31.6		34.5

TABLE 13. WESTERN BASIN REACH MEANS COMPARING TOTAL SUSPENDED SOLIDS (mg/l), VOLATILE SOLIDS (mg/l) AND % VOLATILE SOLIDS

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7
1	1978	TS	27.2	31.6	63.4	83.2	43.5	37.0	33.6
		VS	5.3	6.6	9.6	10.4	7.4	7.3	5.8
		%VS	19.5	20.9	15.1	12.5	17.0	19.7	17.3
2	1978	TS	30.3	28.4	31.5	22.1	18.6	24.3	6.4
		VS	9.4	8.6	8.9	5.9	3.8	9.2	2.5
		%VS	31.0	30.3	28.3	26.7	20.4	37.9	39.1
3	1978	TS	8.5	12.6	20.4	29.4	19.9	18.6	5.6
		VS	5.3	6.0	6.6	6.0	5.1	7.2	3.0
		%VS	62.4	47.6	32.4	20.4	25.6	38.7	53.6
4	1978	TS	25.1	24.6	37.6	15.1	10.3	29.7	28.0
		VS	5.5	6.8	7.6	4.0	3.4	6.7	4.8
		%VS	21.9	27.6	20.2	26.5	33.0	22.6	17.1
1	1979	TS	25.2	41.7	88.6	154.2	134.3	55.1	151.6
		VS	4.7	6.7	10.9	17.0	17.1	7.6	43.1
		%VS	18.7	16.1	12.3	11.0	12.7	13.8	28.4
2	1979	TS	59.1	38.0	31.7	69.7	14.0	28.6	6.2
		VS	12.0	11.2	9.5	7.3	4.6	13.4	2.7
		%VS	20.3	29.5	30.0	10.5	32.9	46.9	43.5
3	1979	TS	45.6	32.0	35.6	24.1	18.7	28.4	12.5
		VS	11.9	12.6	11.8	7.7	6.5	11.0	4.6
		%VS	26.1	39.4	33.1	32.0	34.8	38.7	36.8
4	1979	TS	13.8	19.4	34.9	20.4	19.1	29.1	8.4
		VS	3.6	3.6	8.7	7.1	6.2	8.2	2.1
		%VS	26.1	18.6	24.9	34.8	32.5	28.2	25.0

TS = Mean Total Suspended Solids (mg/l)
VS = Mean Volatile Suspended Solids (mg/l)
%VS = % Volatile Suspended Solids of the Total

TABLE 14. WESTERN BASIN REACH MEANS FOR VOLATILE SOLIDS (mg/l)

CRUISE	YEAR	$\bar{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\bar{X}$	OFFSHORE $\bar{X}$
1	1978	Inshore	6.9	8.6	10.7	13.1	8.8	8.1	9.4	9.4	
		Offshore	2.8	4.7	6.1	8.9	6.0	6.3	3.1		5.4
2	1978	Inshore	12.0	12.4	11.4	8.3	4.0	9.7	3.3	8.7	
		Offshore	8.2	4.9	5.1	3.8	3.8	9.9	1.9		5.4
3	1978	Inshore	6.6	6.6	7.8	8.2	6.0	6.5	3.6	6.5	
		Offshore	3.2	4.7	4.5	4.3	3.6	8.9	2.6		4.5
4	1978	Inshore	6.1	6.7	8.7	5.0	3.5	6.6	5.6	6.0	
		Offshore	4.3	6.8	7.0	3.4	3.0	6.9	4.0		5.1
1	1979	Inshore	6.4	11.4	12.6	22.6	17.8	7.5	22.4	14.4	
		Offshore	2.8	1.9	3.1	8.2	23.3	7.8	118.1		7.9
2	1979	Inshore	15.8	17.0	13.0	5.3	5.4	13.1	3.9	10.5	
		Offshore	9.0	4.7	3.6	18.6	3.5	15.4	1.2		8.0
3	1979	Inshore	14.9	17.1	14.0	10.0	7.6	-8.0	5.5	11.5	
		Offshore	10.1	7.3	7.3	6.1	4.9	10.6	3.7		7.1
4	1979	Inshore	4.9	8.6	11.2	10.5	7.5	8.0	2.7	7.6	
		Offshore	2.6	3.6	3.5	3.2	3.5	9.6	1.7		3.9
	1978	Inshore	7.9	8.6	9.6	8.7	5.6	7.7	5.5	7.7	
		Offshore	4.6	5.3	5.7	5.1	4.1	8.0	2.9		5.1
	1979	Inshore	10.5	13.5	12.7	12.1	9.6	9.5	8.6	10.9	
		Offshore	6.1	4.4	4.4	9.0	8.8	10.9	2.2		6.5

TABLE 15. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR PERCENT VOLATILE SOLIDS

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	17.1	18.1	14.3	12.1	15.5	17.7	15.6	15.8	
		Offshore	34.6	30.3	22.4	12.5	17.7	25.1	22.6		23.6
2	1978	Inshore	30.0	27.4	25.6	24.0	17.9	36.6	35.5	28.1	
		Offshore	28.4	42.6	49.5	45.8	54.3	39.8	61.3		45.9
3	1978	Inshore	58.9	39.1	29.8	17.3	21.5	35.5	44.4	35.2	
		Offshore	72.7	54.7	50.6	54.4	57.1	42.4	74.3		58.0
4	1978	Inshore	20.7	28.4	18.6	23.0	30.7	22.0	15.9	22.8	
		Offshore	23.1	20.4	19.7	30.1	35.7	22.4	20.7		24.6
1	1979	Inshore	17.2	14.4	12.1	10.5	9.8	12.8	11.3	12.6	
		Offshore	25.2	23.8	20.8	13.3	29.3	14.2	72.3		28.4
2	1979	Inshore	19.5	31.5	30.0	26.4	28.6	45.5	39.0	31.5	
		Offshore	19.6	23.3	28.6	6.6	64.8	49.8	63.2		36.6
3	1979	Inshore	27.8	39.1	32.2	30.5	32.9	----	36.9	33.2	
		Offshore	20.4	38.0	48.3	43.6	46.2	46.7	33.9		39.6
4	1979	Inshore	29.2	35.8	25.8	32.4	29.9	28.2	26.2	29.6	
		Offshore	21.7	25.9	24.0	34.8	39.8	28.9	24.6		28.5
	1978	Inshore	31.7	28.3	22.1	19.1	21.4	27.9	27.9	25.5	
		Offshore	39.7	37.0	35.6	35.7	41.2	32.4	44.7		38.0
	1979	Inshore	23.4	30.2	25.0	24.9	25.3	28.8	28.4	26.7	
		Offshore	21.7	27.8	30.4	39.4	45.0	34.9	48.5		33.3

TABLE 16. WESTERN BASIN REACH MEANS
FOR CHLOROPHYLL a (ug/l)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\bar{X}$	YEARLY $\bar{X}$
1	1978	$\bar{x}$	12.70	8.00	13.6	3.50	2.2	13.4	11.20	10.3	
		max	129.00	44.00	112.0	13.00	6.0	53.0	24.00		
		min	.23	.65	.3	0.00	0.0	0.0	.23		
2	1978	$\bar{x}$	28.0	28.0	31.0	15.0	8.4	47.1	14.1	26.9	
		max	66.0	77.0	77.0	76.0	53.0	209.0	50.0		
		min	4.0	9.0	5.0	.3	.8	.8	1.6		
3	1978	$\bar{x}$	26.8	39.8	43.5	16.4	12.6	36.6	11.8	29.7	
		max	70.0	99.0	136.0	48.0	35.0	119.0	30.0		
		min	2.0	17.0	13.0	7.0	5.0	5.0	3.0		
4	1978	$\bar{x}$	31.7	31.1	33.8	21.7	21.9	32.9	14.0	27.6	
		max	53.0	67.0	89.0	49.0	36.0	94.0	22.0		
		min	1.5	0.0	12.0	14.0	10.0	8.0	9.0		
1	1979	$\bar{x}$	7.0	16.5	17.90	13.6	14.2	10.5	9.6	12.6	
		max	39.0	41.0	43.00	27.0	24.0	19.0	21.0		
		min	.7	.4	.89	1.4	4.5	1.5	0.0		
2	1979	$\bar{x}$	33.2	36.1	35.8	18.4	17.4	57.1	7.7	31.8	
		max	81.0	120.0	131.0	66.0	66.0	210.0	32.0		
		min	.8	3.0	4.0	7.0	8.0	1.5	.5		
3	1979	$\bar{x}$	37.7	50.2	54.7	38.9	25.7	44.3	18.3	40.5	
		max	61.0	85.0	116.0	81.0	45.0	167.0	35.0		
		min	1.3	17.0	8.6	13.0	8.0	8.0	11.0		
4	1979	$\bar{x}$	13.2	29.0	36.7	34.0	22.7	35.0	10.7	27.2	
		max	50.0	81.0	88.0	61.0	39.0	98.0	17.0		
		min	.5	4.0	10.0	8.0	12.0	10.0	6.0		
	1978	$\bar{x}$	24.8	26.7	30.5	14.2	11.3	32.5	12.8		23.6
	1979	$\bar{x}$	22.8	32.9	36.3	26.2	20.0	36.7	11.6		28.0

TABLE 17. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR CHLOROPHYLL a (ug/l)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	27.4	13.8	21.7	5.3	4.4	13.2	14.4	14.3	
		Offshore	3.8	5.3	7.6	3.2	0.2	10.2	6.2		5.2
2	1978	Inshore	37.3	37.5	38.3	25.2	6.2	50.9	14.6	30.0	
		Offshore	22.0	24.4	23.9	17.0	10.3	49.4	13.7		22.9
3	1978	Inshore	39.4	53.4	55.5	25.6	14.7	36.6	16.1	34.5	
		Offshore	18.3	31.7	23.4	13.2	10.1	40.3	8.5		20.8
4	1978	Inshore	33.0	37.6	38.6	28.8	25.3	34.2	15.6	30.4	
		Offshore	28.8	22.9	20.6	19.5	19.9	33.6	12.9		22.6
1	1979	Inshore	10.9	24.3	20.5	11.6	14.7	10.5	8.9	14.5	
		Offshore	2.3	8.7	14.5	16.5	13.3	9.9	10.4		10.8
2	1979	Inshore	48.6	68.7	47.4	27.6	22.5	53.3	11.7	39.9	
		Offshore	21.2	16.3	14.8	13.7	12.8	67.5	5.3		21.6
3	1979	Inshore	42.5	64.9	62.0	47.0	27.4	48.1	21.1	44.7	
		Offshore	33.1	33.4	36.5	32.8	23.9	45.1	15.2		31.4
4	1979	Inshore	26.2	38.3	48.8	46.2	25.9	36.7	12.3	33.5	
		Offshore	4.7	17.6	18.4	22.7	18.2	38.1	9.7		18.5
	1978	Inshore	34.3	35.6	38.5	21.2	12.6	33.7	15.2	27.3	
		Offshore	32.1	49.1	44.7	33.1	21.5	37.2	13.5		33.0
	1979	Inshore	18.2	21.1	18.9	13.2	10.1	33.4	10.3	17.9	
		Offshore	15.3	19.0	21.1	21.4	17.1	40.2	10.2		20.6

TABLE 18. WESTERN BASIN REACH MEANS
FOR TOTAL ORGANIC CARBON (ug/l)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\bar{X}$	YEARLY $\bar{X}$
1	1978	$\bar{x}$	2307	3823	5979	5099	3153	3222	3131	3816	
		max	4269	9502	12634	6511	4345	7584	9003		
		min	1126	1305	2493	3153	1405	1405	1166		
2	1978	$\bar{x}$	7916	6388	7463	5296	4456	6772	4271	6080	
		max	24129	10862	12323	10502	5629	14852	9022		
		min	4293	3896	4056	3415	2874	2871	2925		
3	1978	$\bar{x}$	5300	6310	5812	3338	4562	4962	3364	4807	
		max	9749	9048	11716	6129	6129	7611	4638		
		min	2767	4366	307	307	3365	2912	2825		
4	1978	$\bar{x}$	4733	4570	6699	4662	3293	6869	3882	4958	
		max	7482	9854	10393	7140	4234	15037	5667		
		min	2775	3391	3623	3552	2291	2291	2788		
1	1979	$\bar{x}$	ND	ND	ND	ND	ND	ND	ND		
		max	ND	ND	ND	ND	ND	ND	ND		
		min	ND	ND	ND	ND	ND	ND	ND		
2	1979	$\bar{x}$	ND	ND	ND	ND	ND	ND	ND		
		max	ND	ND	ND	ND	ND	ND	ND		
		min	ND	ND	ND	ND	ND	ND	ND		
3	1979	$\bar{x}$	ND	ND	ND	ND	ND	ND	ND		
		max	ND	ND	ND	ND	ND	ND	ND		
		min	ND	ND	ND	ND	ND	ND	ND		
4	1979	$\bar{x}$	ND	ND	ND	ND	ND	ND	ND		
		max	ND	ND	ND	ND	ND	ND	ND		
		min	ND	ND	ND	ND	ND	ND	ND		
	1978	$\bar{x}$	5064	5273	6488	4598	3866	5458	3662		4915
	1979	$\bar{x}$									

TABLE 19. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR TOTAL ORGANIC CARBON (ug/l)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore Offshore	3000 1457	4753 3497	7237 3516	5223 4153	3744 2149	3605 2814	4698 1921	4609	2787
2	1978	Inshore Offshore	10230 5073	8315 4529	9264 4316	6435 3922	4649 4252	6829 7450	3512 5602	7033	5021
3	1978	Inshore Offshore	6082 5005	7164 4888	7135 2758	4496 307	4898 3816	5357 4765	3725 2954	5551	4031
4	1978	Inshore Offshore	5192 3040	6018 5815	7429 5973	4939 3849	3498 2601	7200 6930	4282 3911	5508	4588
1	1979	Inshore Offshore									
2	1979	Inshore Offshore									
3	1979	Inshore Offshore									
4	1979	Inshore Offshore									
	1978	Inshore Offshore	6126 3644	6563 4682	7766 4141	5273 3975	4197 3205	5748 5490	4054 3597	5675	4105
	1979	Inshore Offshore									

TABLE 20. WESTERN BASIN REACH MEANS FOR PARTICULATE ORGANIC CARBON (ug/l)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\bar{X}$	YEARLY $\bar{X}$
1	1978	$\bar{x}$	1044	1595	2479	2792	1679	1769	1635	1856	
		max	2217	4737	5464	3433	2938	4935	4098		
		min	409	672	775	1744	692	692	672		
2	1978	$\bar{x}$	4879	3366	3285	1893	889	2816	997	2120	
		max	19814	7096	7096	6396	1393	9757	1311		
		min	2167	1850	1794	747	446	446	602		
3	1978	$\bar{x}$	1854	2534	2807	1522	1192	3414	922	2035	
		max	3586	3878	6299	3065	3065	10407	1752		
		min	1472	1472	1059	743	776	604	454		
4	1978	$\bar{x}$	1665	2671	3138	1619	1371	3903	1551	2274	
		max	2557	6859	6859	2832	1806	9192	2920		
		min	686	1017	1268	923	729	729	1151		
1	1979	$\bar{x}$	1859	2723	4188	5350	4568	2862	3092	3520	
		max	3322	6216	7242	9955	7681	4881	11978		
		min	680	583	657	2153	2722	2001	336		
2	1979	$\bar{x}$	4452	4443	3420	1678	3180	3938	1074	3169	
		max	8556	7871	7651	4111	2132	9699	2596		
		min	1770	1033	847	847	806	570	406		
3	1979	$\bar{x}$	3832	4252	4168	3199	2566	4268	1592	3411	
		max	6177	6642	6405	6670	3329	7318	2404		
		min	2043	1801	1579	1446	1731	1615	979		
4	1979	$\bar{x}$	1597	2629	3410	3332	2535	3650	852	2572	
		max	3102	5010	5727	7391	5397	7287	1447		
		min	112	1139	1046	1201	1369	756	564		
	1978	$\bar{x}$	2360	2542	2927	1956	1283	2976	1276		2071
	1979	$\bar{x}$	2935	3512	3796	3390	3212	3680	1652		3168

TABLE 21. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR PARTICULATE ORGANIC CARBON (ug/l)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	1450	2272	3164	3108	2298	1986	2269	2364	
		Offshore	635	958	1237	2287	991	1442	1365		1274
2	1978	Inshore	7244	4933	4216	2783	855	2695	983	3387	
		Offshore	2629	1929	1983	1270	859	3352	966		1855
3	1978	Inshore	2361	3148	3547	2026	1418	3028	1212	2391	
		Offshore	1315	1778	1471	1059	814	4442	656		1648
4	1978	Inshore	1788	2763	3213	1999	1595	4069	1917	2478	
		Offshore	1064	3373	3402	1211	977	4045	1211		2183
1	1979	Inshore	2150	4374	5001	6502	5099	3083	4172	4340	
		Offshore	1466	841	1269	3377	3609	2530	1982		2153
2	1979	Inshore	5740	6873	4537	2053	1618	3905	1492	3745	
		Offshore	3242	1828	1164	847	1072	4335	592		2039
3	1979	Inshore	4657	5482	4668	3962	2771	4595	1913	4007	
		Offshore	3146	2380	3054	2587	2006	4307	1262		2677
4	1979	Inshore	2285	3267	4329	5036	3166	3585	1033	3243	
		Offshore	1108	1569	1270	1414	1582	4228	665		1691
	1978	Inshore	3211	3279	3535	2497	1542	2945	1595	2658	
		Offshore	1411	2009	2023	1457	910	3320	1050		1740
	1979	Inshore	3708	5000	4634	4388	4065	3792	2153	3963	
		Offshore	2241	1655	1689	2459	2067	3850	1125		2155

TABLE 22. WESTERN BASIN REACH MEANS FOR DISSOLVED ORGANIC CARBON (ug/l)

CRUISE	YEAR		REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	CRUISE $\overline{X}$	YEARLY $\overline{X}$
1	1978	$\overline{x}$ max min	1263	2228	3500	2307	1474	1453	1496	1960	
2	1978	$\overline{x}$ max min	3037	3022	4178	3403	3567	3956	3274	3491	
3	1978	$\overline{x}$ max min	3446	3776	3005	1816	3370	1548	2442	2772	
4	1978	$\overline{x}$ max min	3068	1899	3561	3043	1922	2966	2331	2684	
1	1979	$\overline{x}$ max min									
2	1979	$\overline{x}$ max min									
3	1979	$\overline{x}$ max min									
4	1979	$\overline{x}$ max min									
	1978	$\overline{x}$	2704	2731	3561	2642	2583	2480	2386		2727
	1979	$\overline{x}$									

TABLE 23. INSHORE-OFFSHORE WESTERN BASIN REACH MEANS FOR DISSOLVED ORGANIC CARBON (ug/l)

CRUISE	YEAR	$\overline{X}$	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	INSHORE $\overline{X}$	OFFSHORE $\overline{X}$
1	1978	Inshore	1550	2481	4073	2115	1446	1619	2429	2245	
		Offshore	822	2539	2279	1866	1158	1372	556		1513
2	1978	Inshore	2986	3382	5048	3652	3794	4134	2529	3159	
		Offshore	2444	2600	2333	2652	3393	4098	4636		3165
3	1978	Inshore	3721	4016	3588	2470	3480	2329	2513	3160	
		Offshore	3690	3110	1287	752	3002	323	2298		2285
4	1978	Inshore	3404	3255	4216	2940	1903	3131	2365	3031	
		Offshore	1976	2442	2571	2638	1624	2885	2700		2405
1	1979	Inshore									
		Offshore									
2	1979	Inshore									
		Offshore									
3	1979	Inshore									
		Offshore									
4	1979	Inshore									
		Offshore									
	1978	Inshore	2915	3284	4231	2794	2656	2803	2459	2899	
		Offshore	2233	2673	2118	2385	2294	2170	2548		2342
	1979	Inshore									
		Offshore									

FIGURES

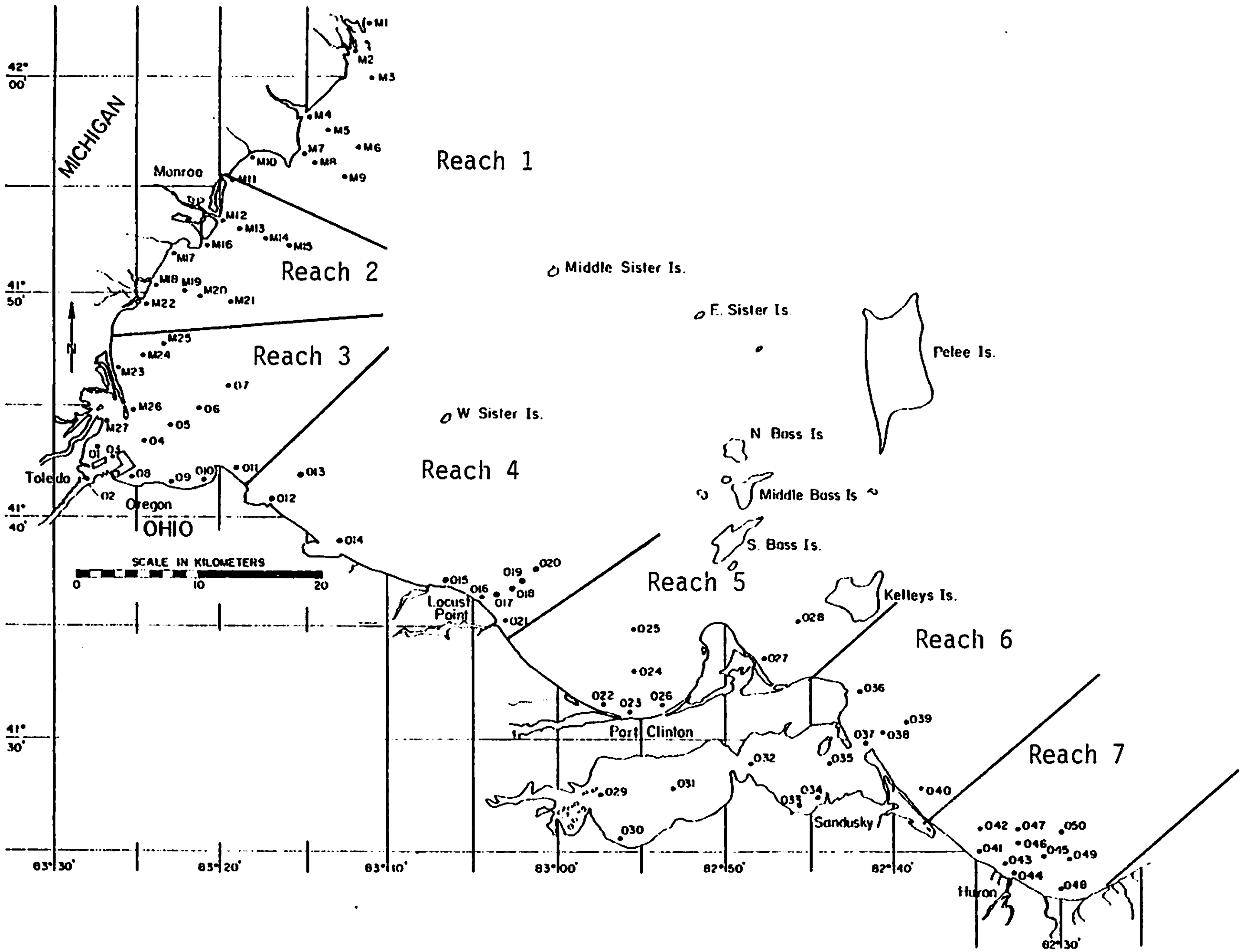


Figure 1. Western Basin Nearshore Area Broken Down into Reaches.

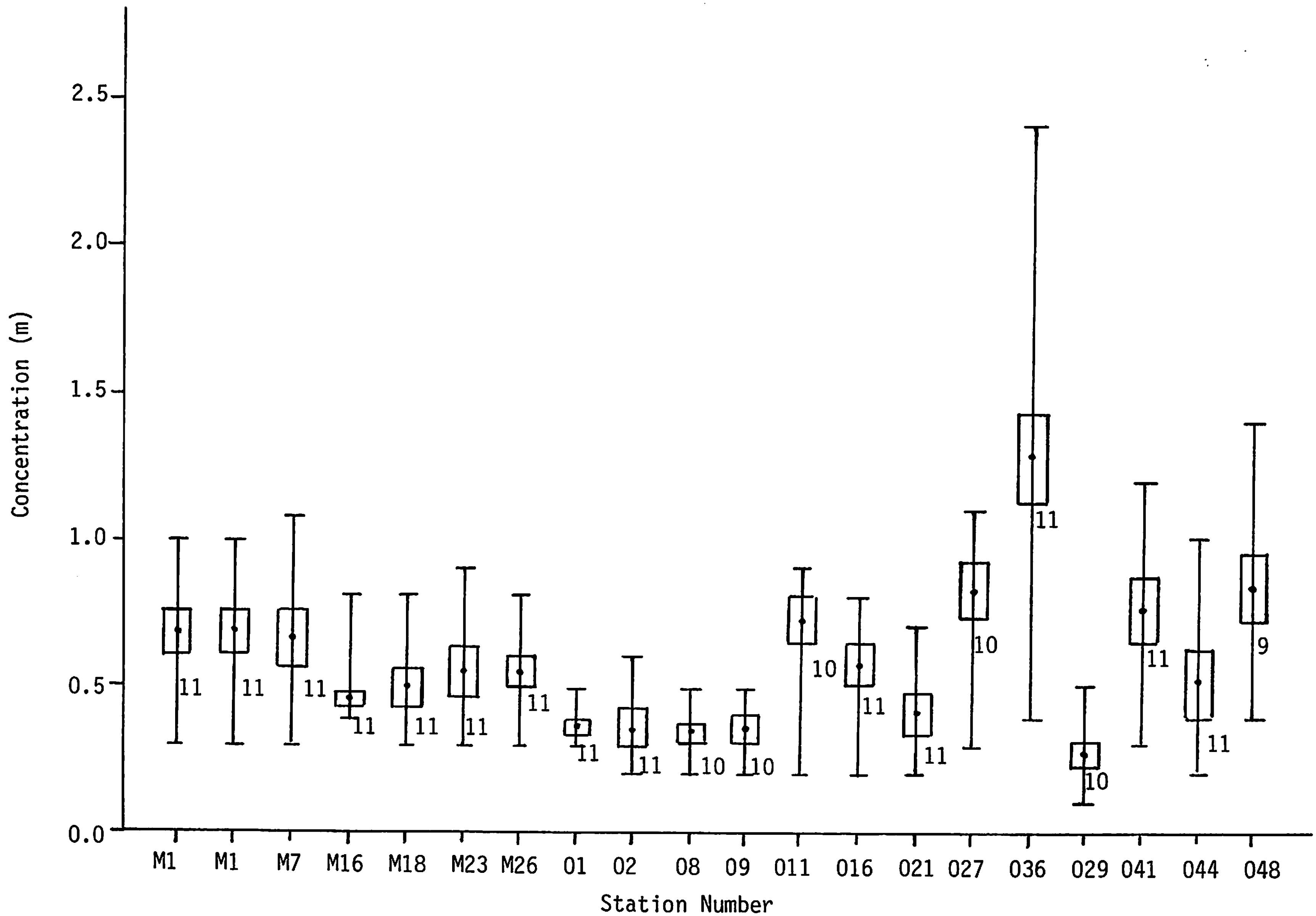


Figure 2. Annual Average Secchi Depth at Inshore Stations in 1978.

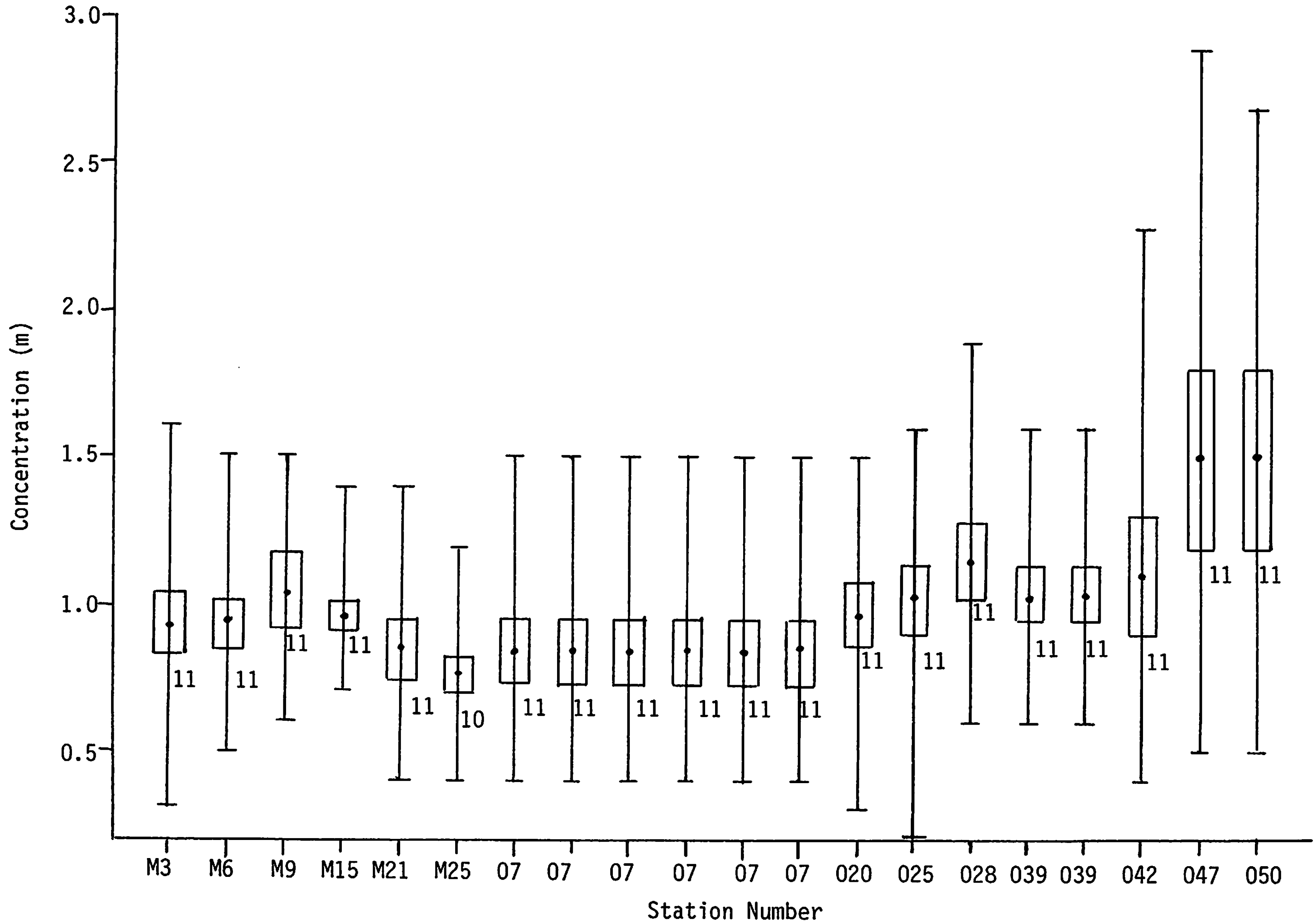


Figure 3. Annual Average Secchi Depth at Offshore Stations in 1978.

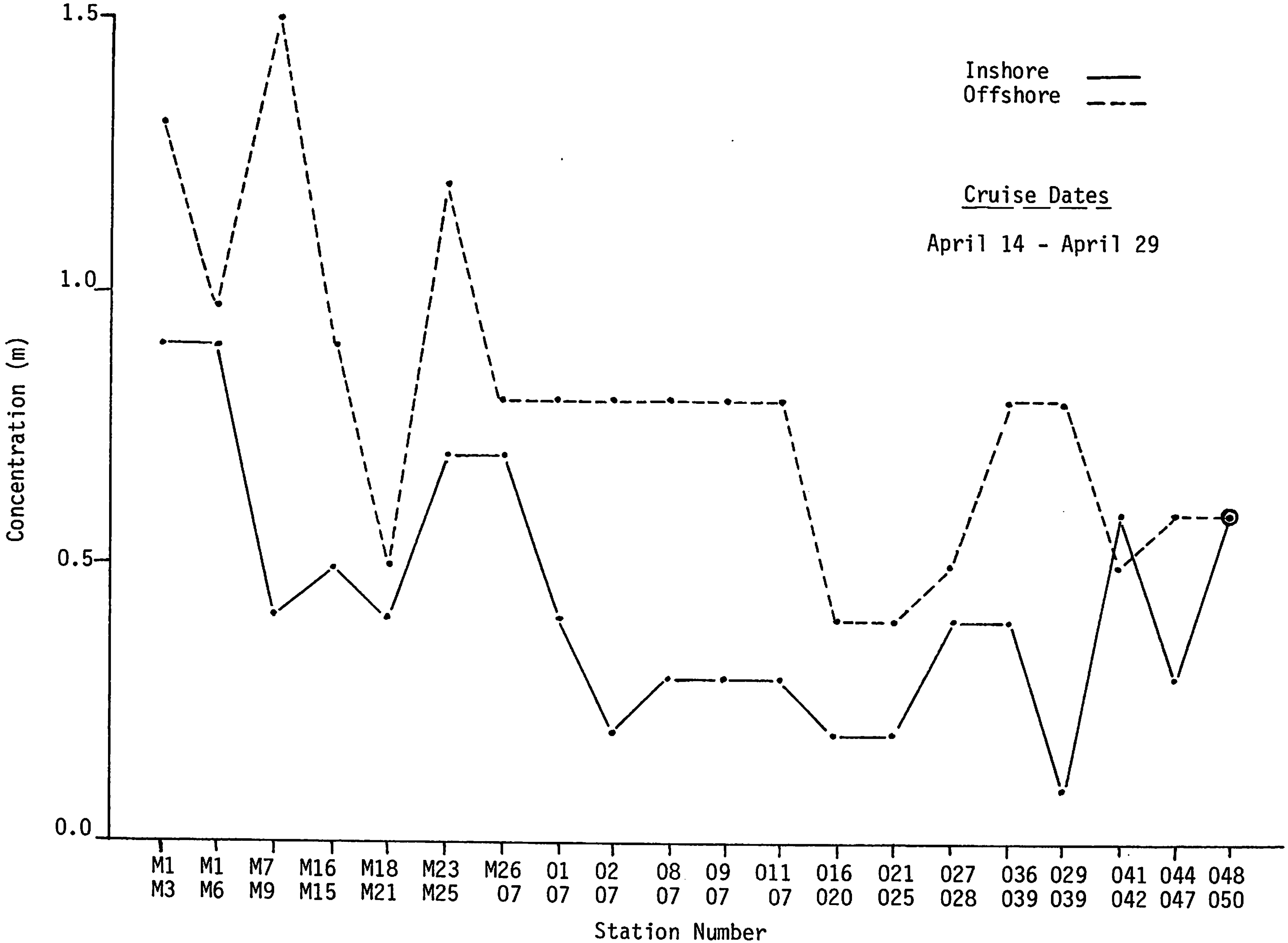


Figure 4. Secchi Depth at Inshore and Offshore Stations for Cruise 1 of 1978.

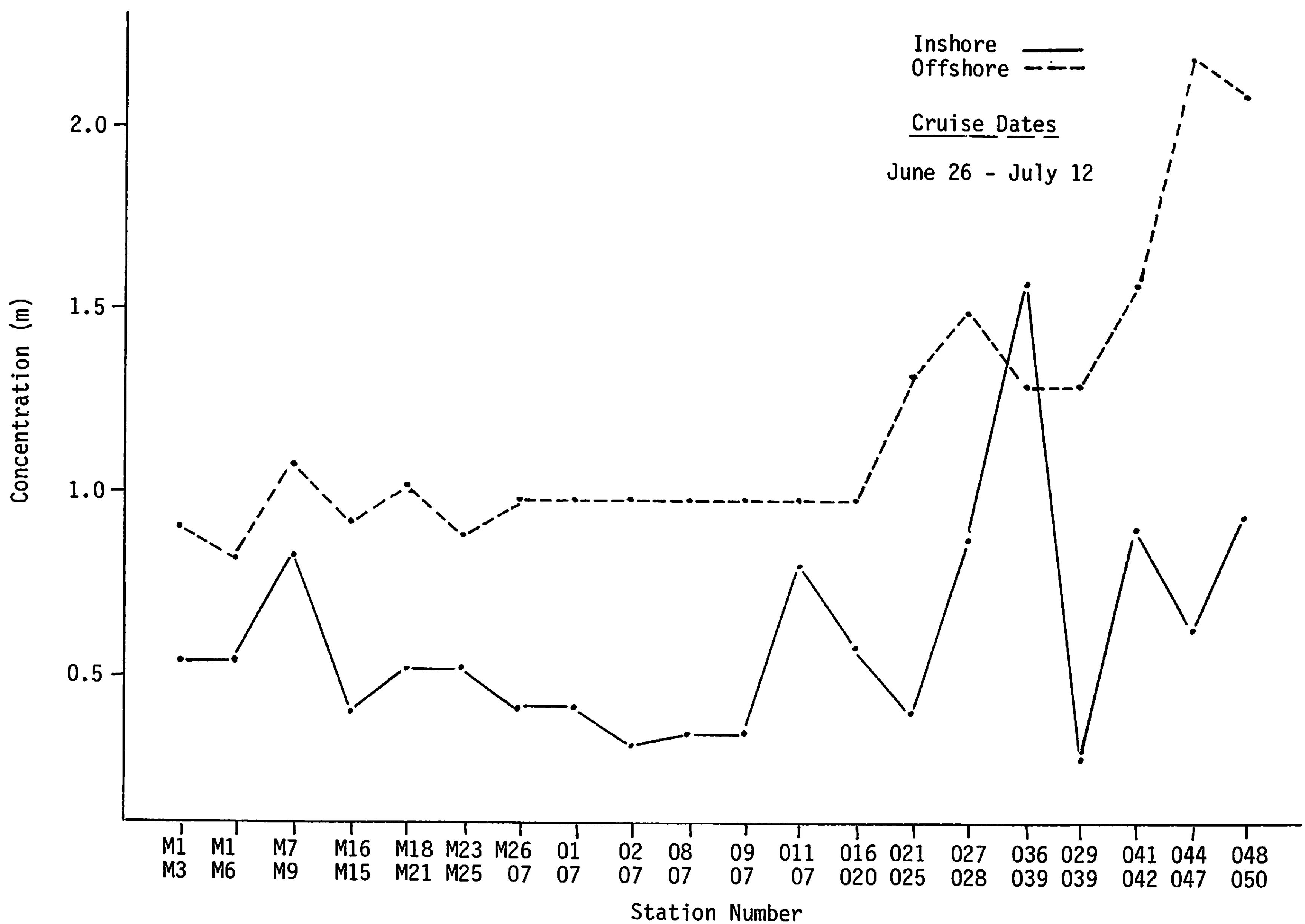


Figure 5. Secchi Depth at Inshore and Offshore Stations for Cruise 2 of 1978.

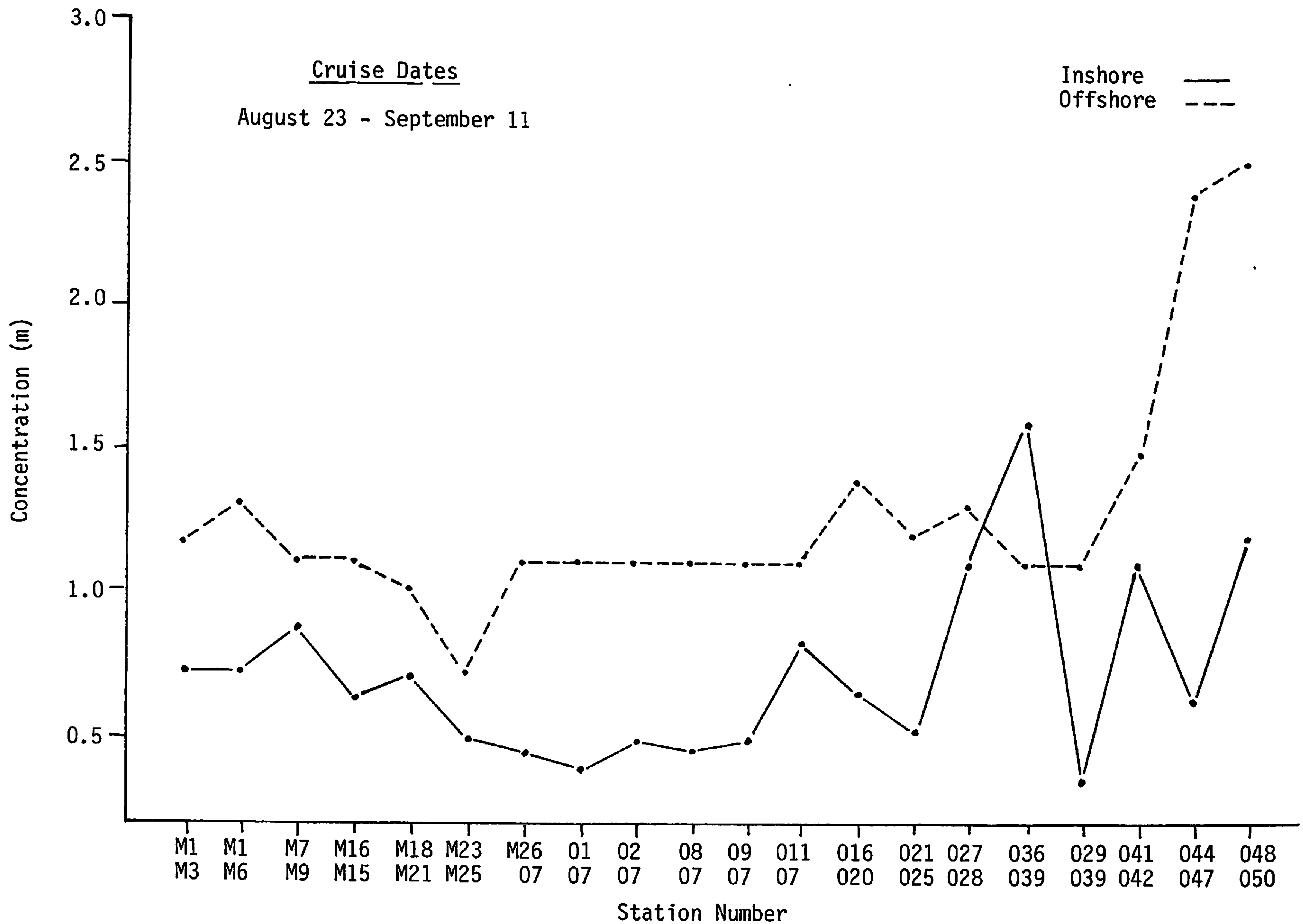


Figure 6. Secchi Depth at Inshore and Offshore Stations for Cruise 3 of 1978.

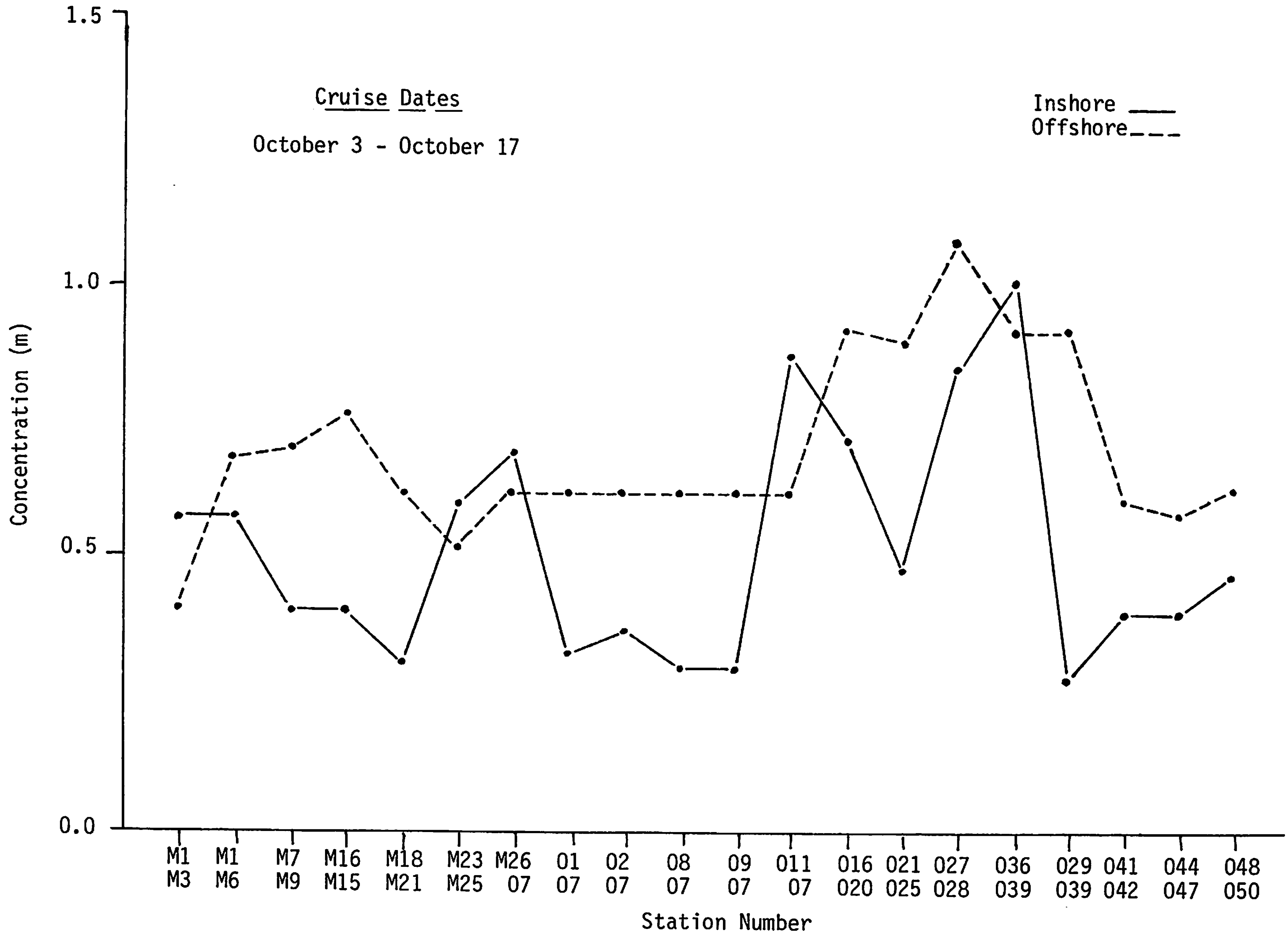


Figure 7. Secchi Depth at Inshore and Offshore Stations for Cruise 4 of 1978.

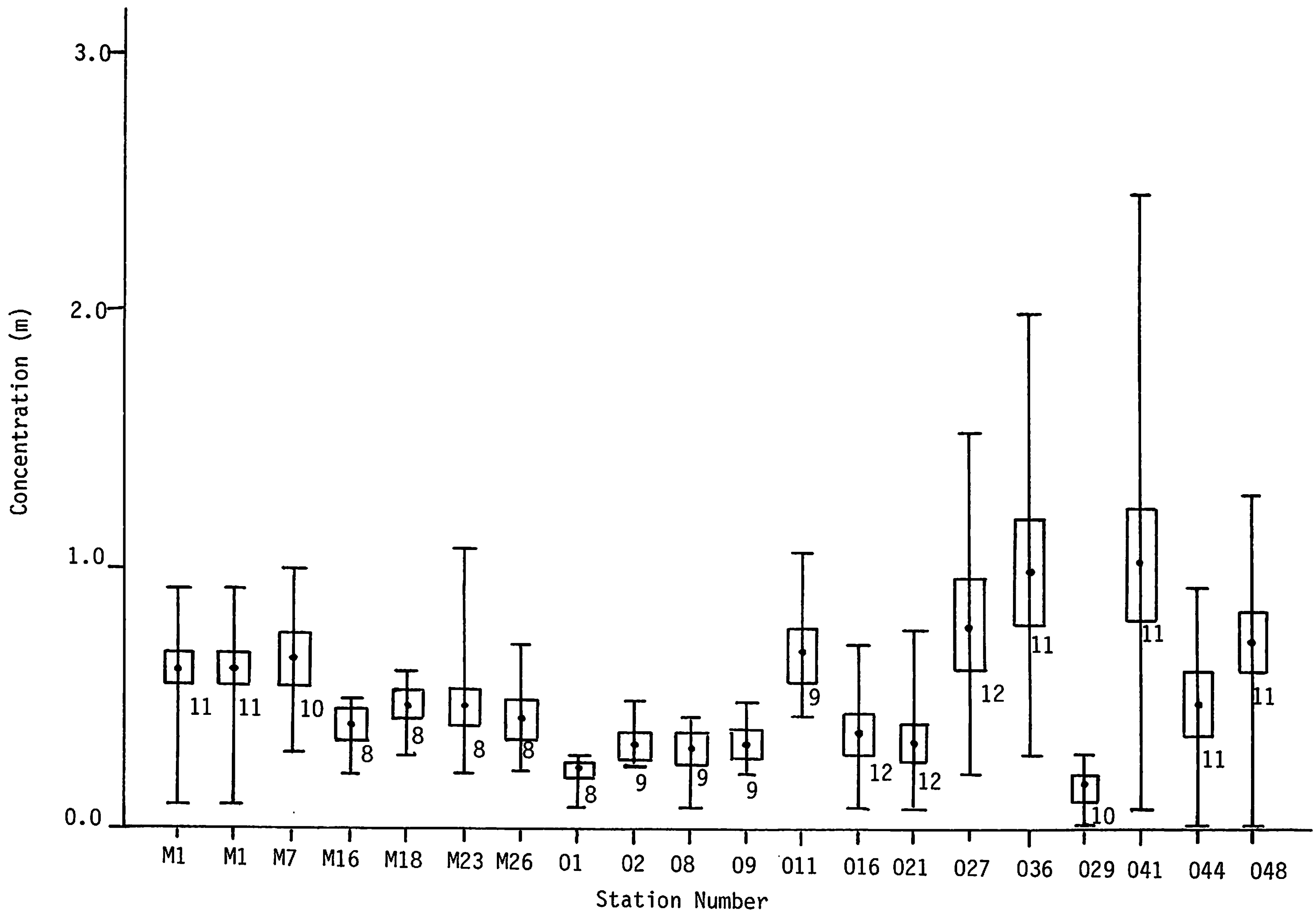


Figure 8. Annual Average Secchi Depth at Inshore Stations in 1979.

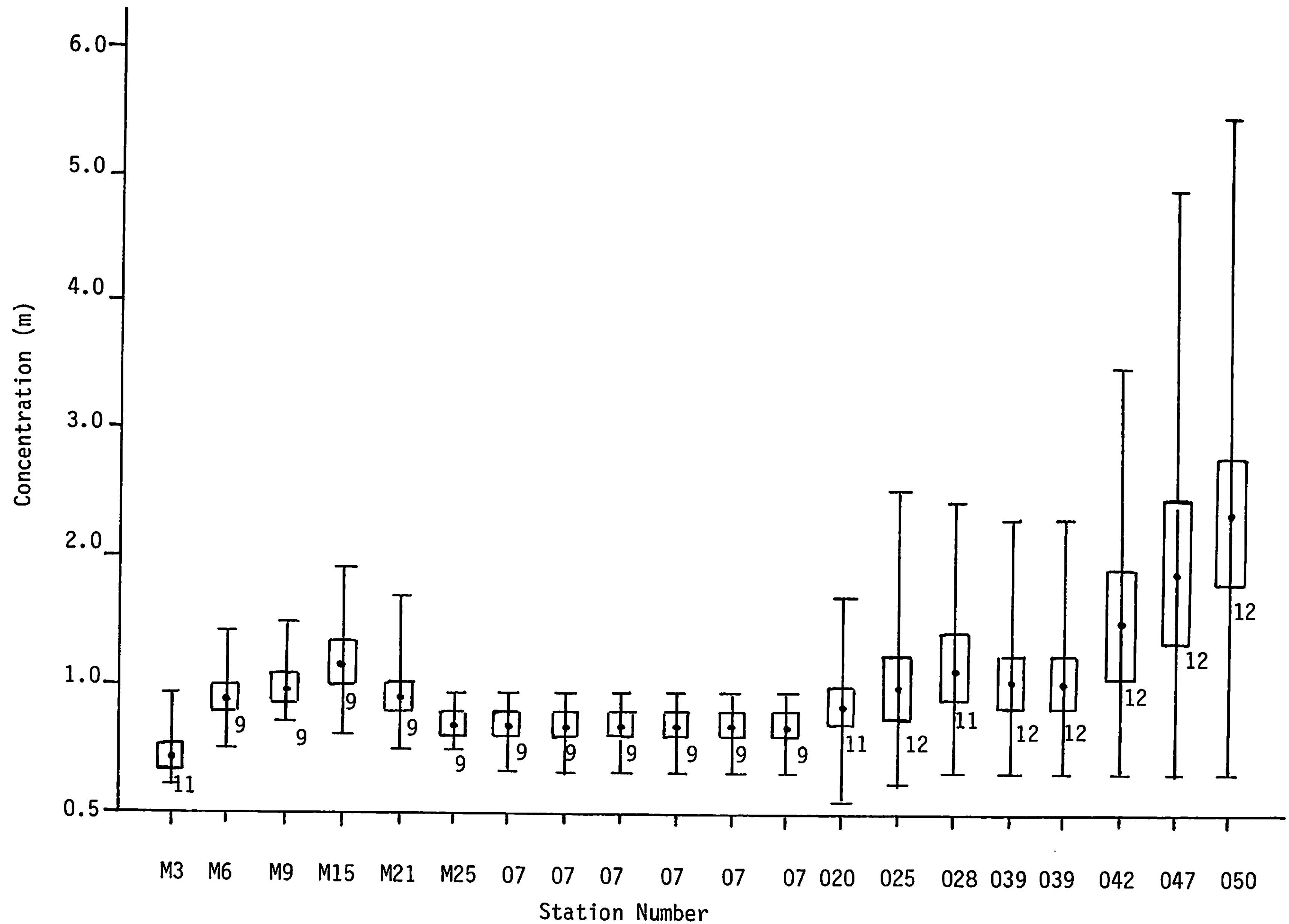


Figure 9. Annual Average Secchi Depth at Offshore Stations in 1979.

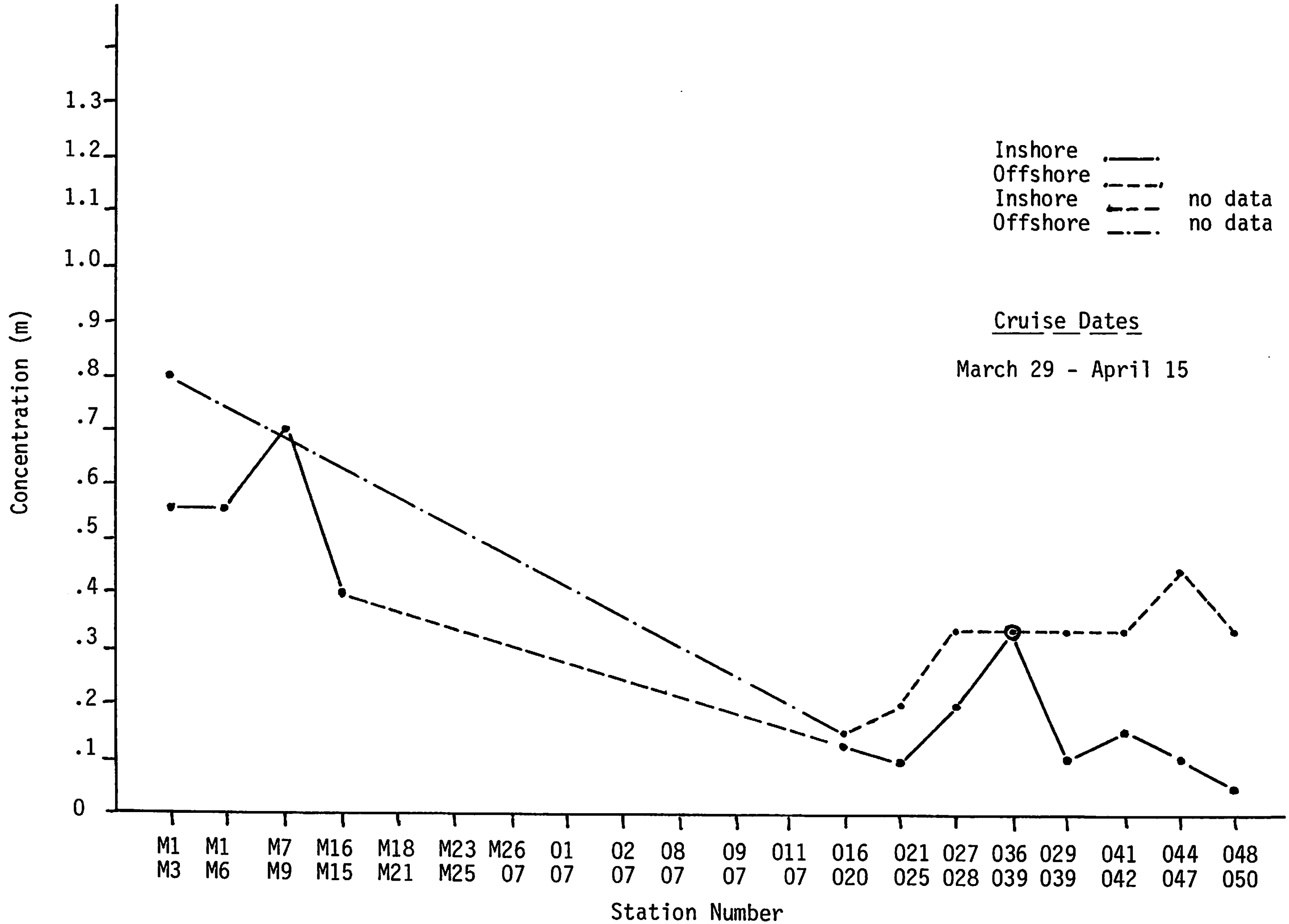


Figure 10. Secchi at Inshore and Offshore Stations for Cruise 1 of 1979.

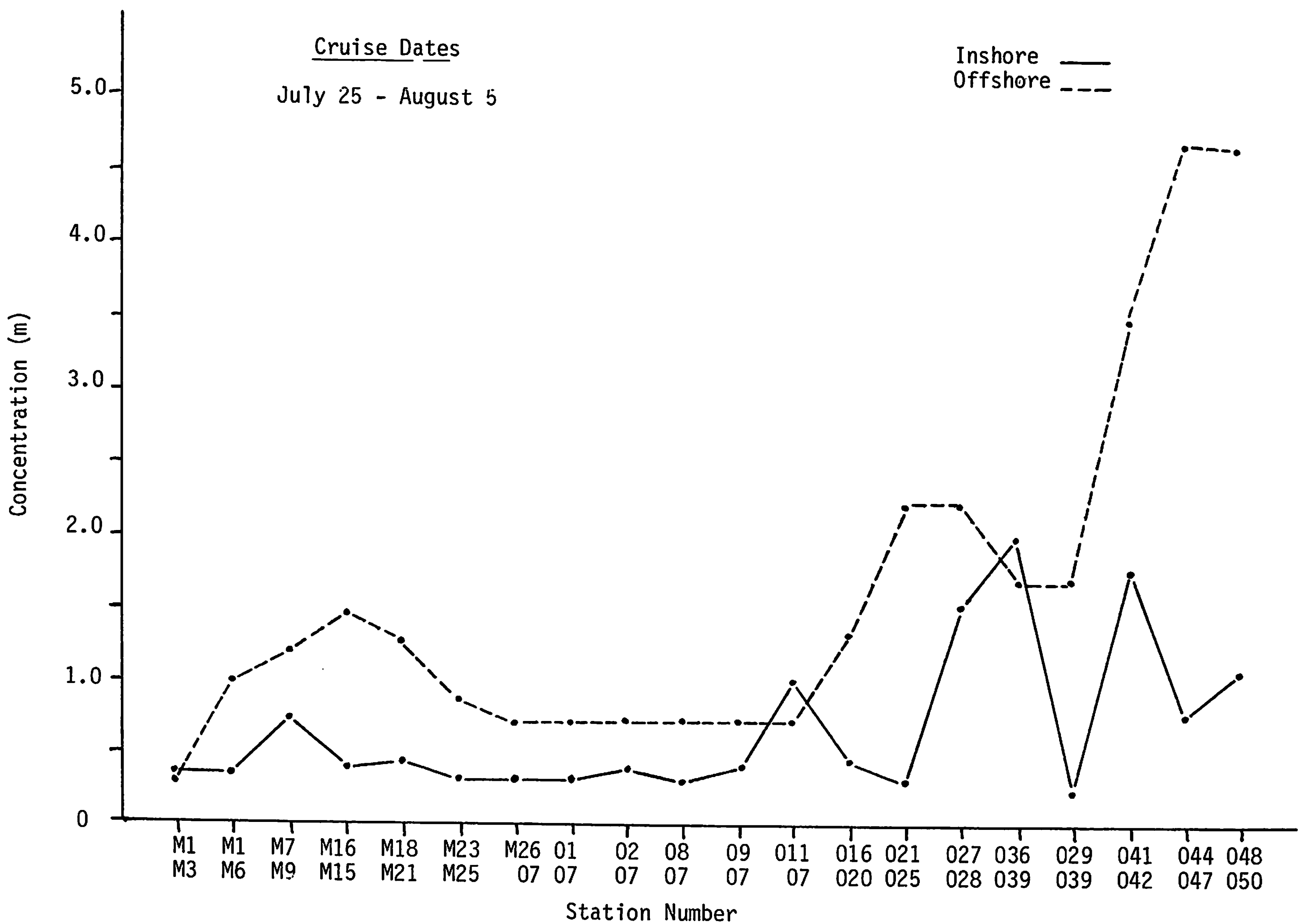


Figure 11. Secchi Depth at Inshore and Offshore Stations for Cruise 2 of 1979.

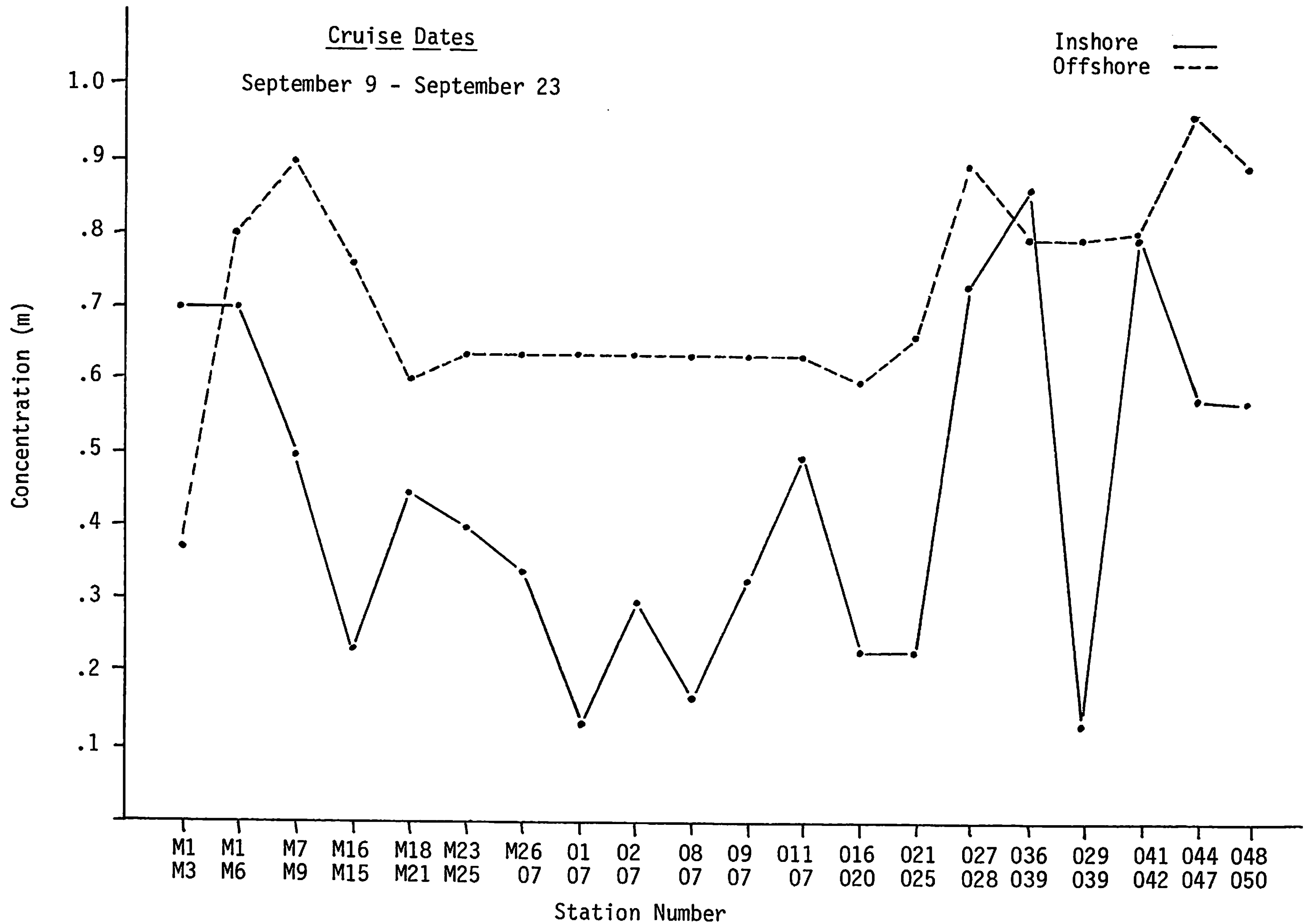


Figure 12. Secchi Depth at Inshore and Offshore Stations for Cruise 3 of 1979.

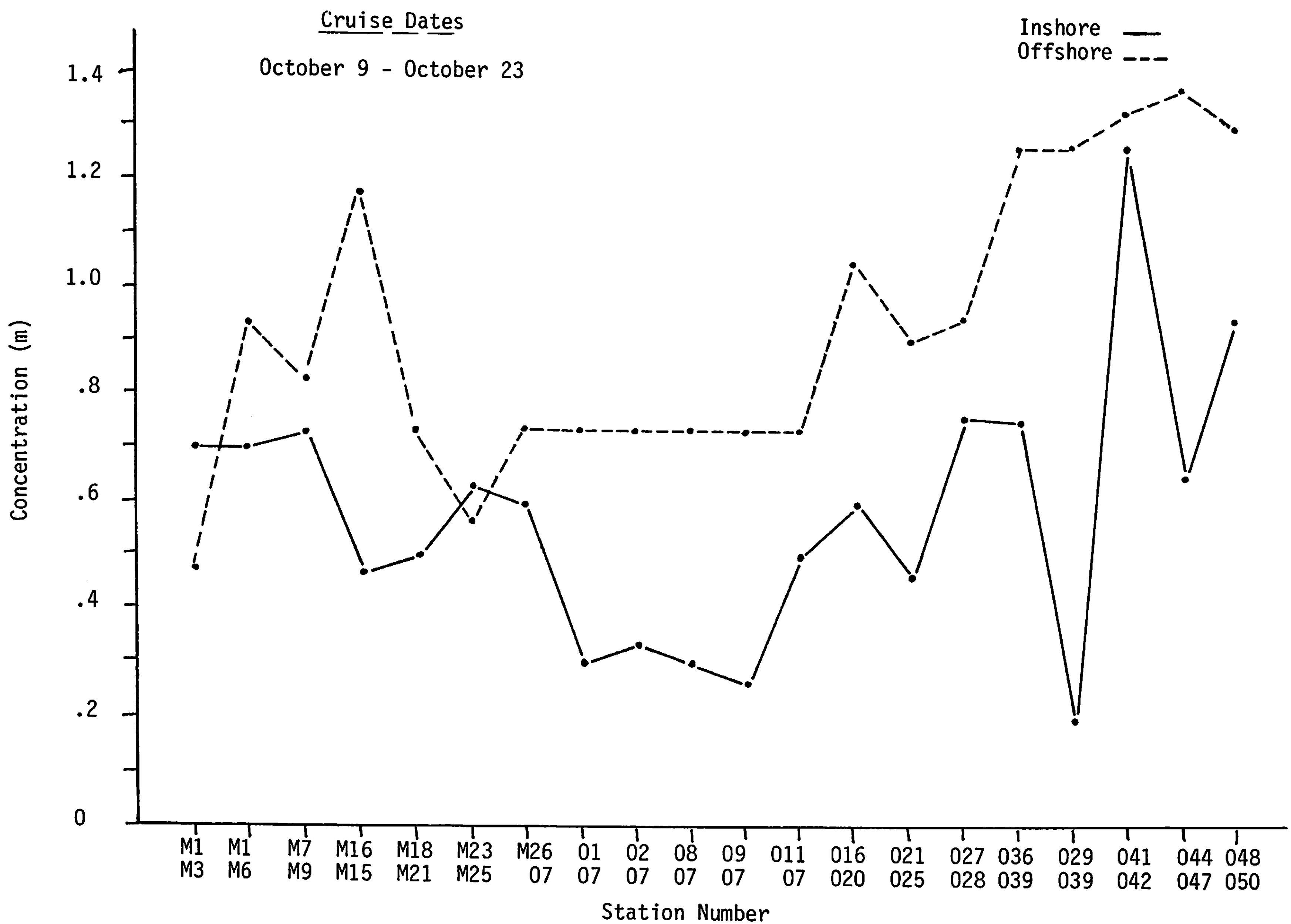


Figure 13. Secchi Depth at Inshore and Offshore Stations for Cruise 4 of 1979.

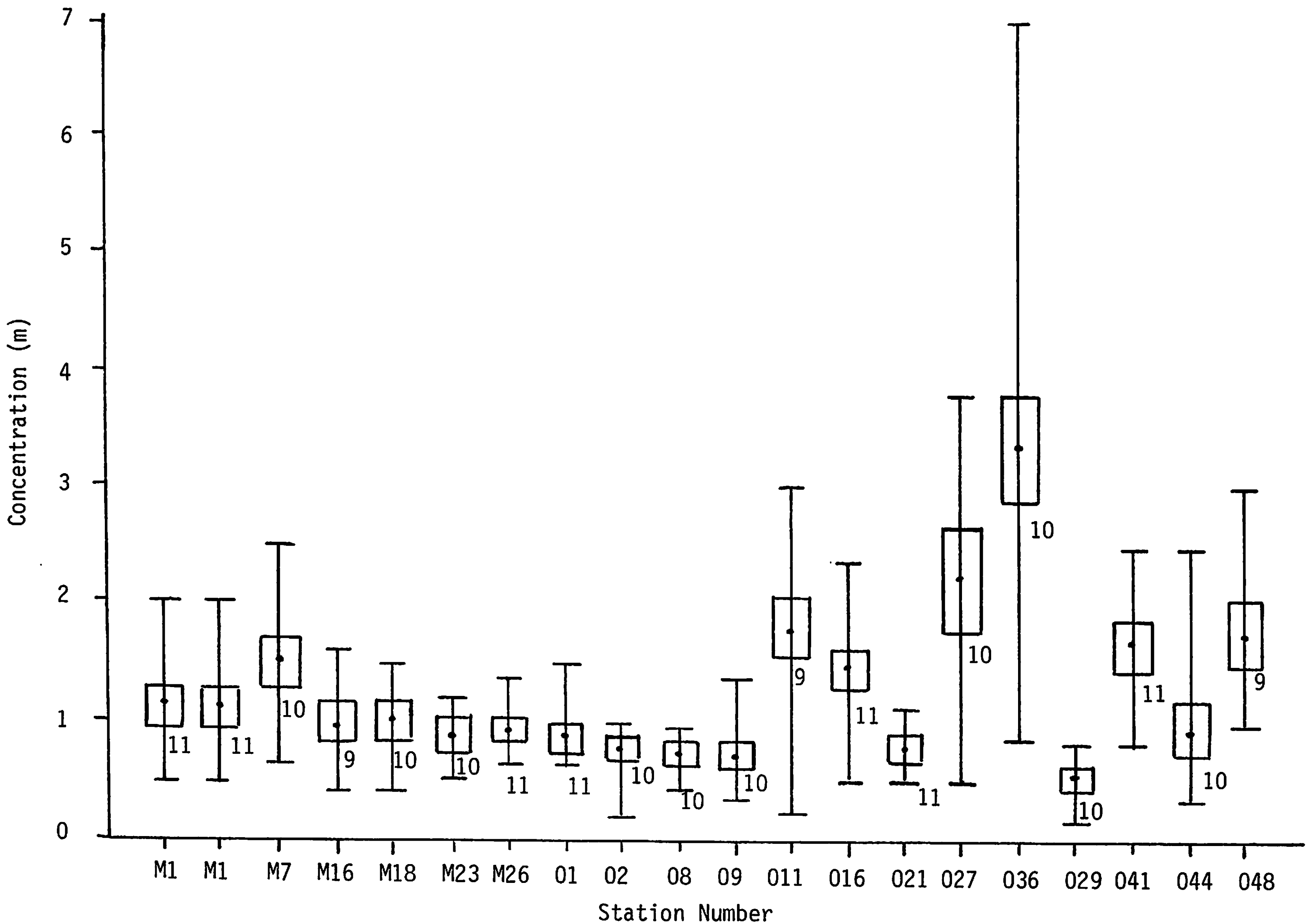


Figure 14. Annual Average Extinction Depth at Inshore Stations in 1978.

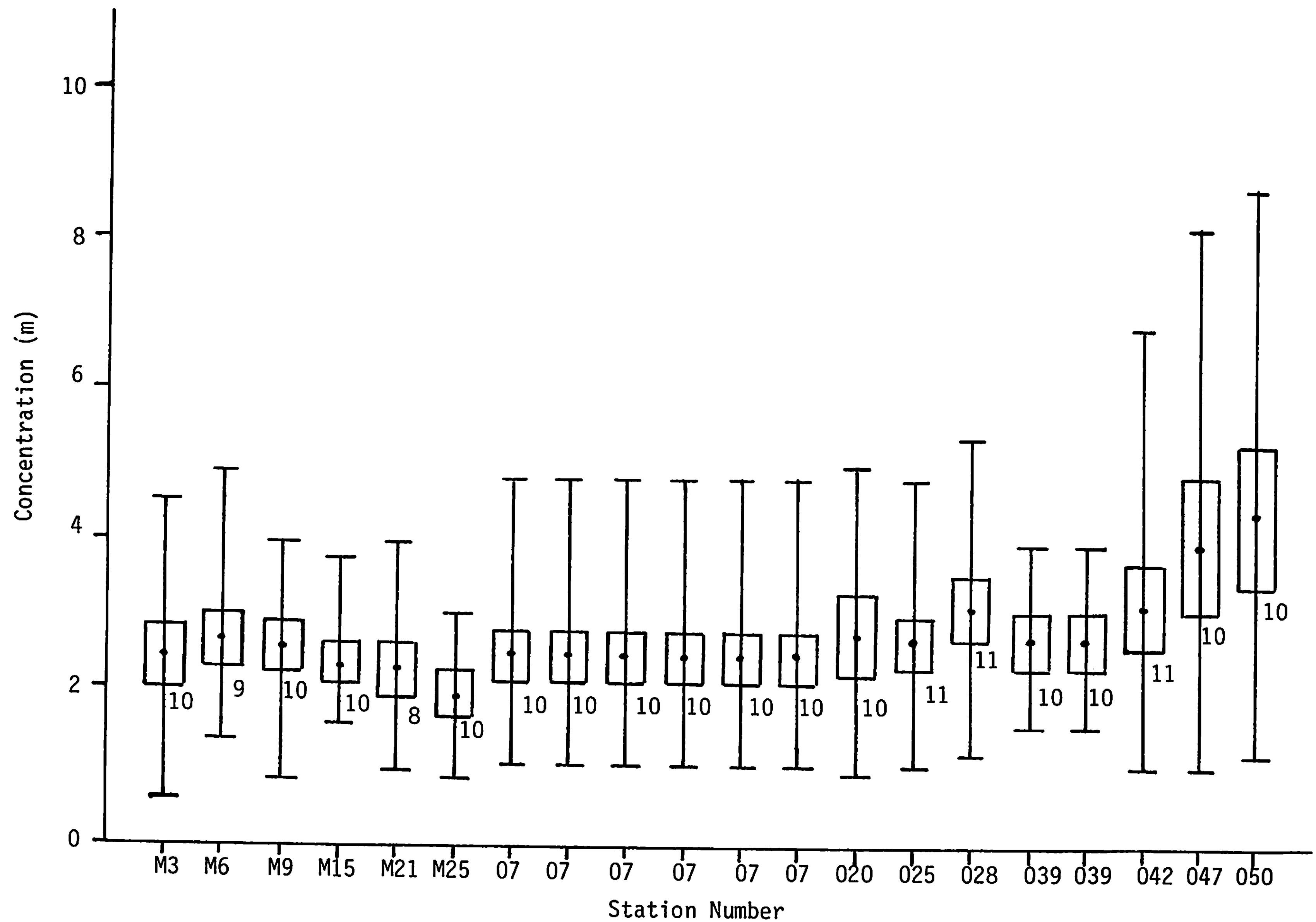


Figure 15. Annual Average Extinction Depth at Offshore Stations in 1978.

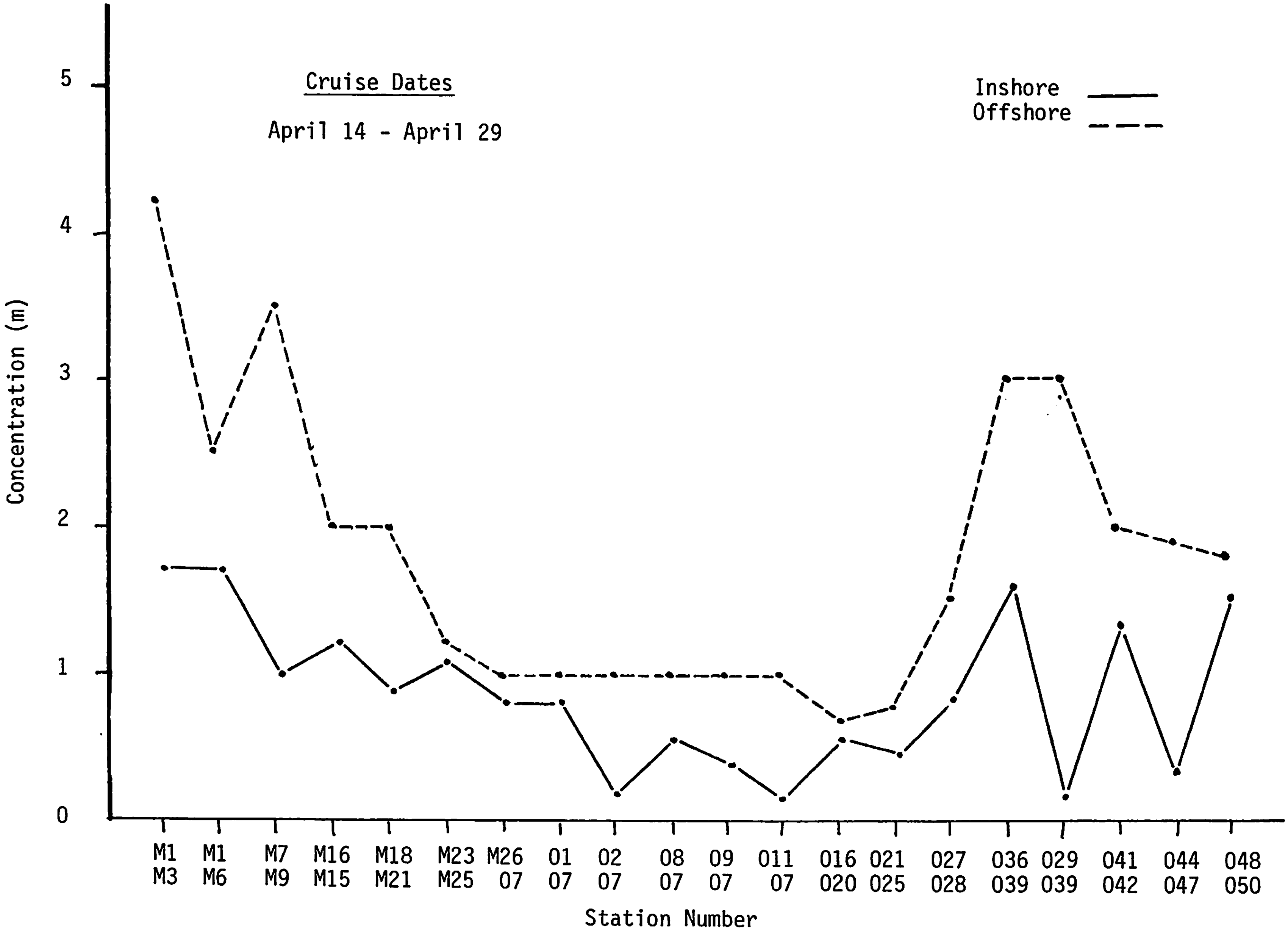


Figure16. Extinction Depth at Inshore and Offshore Stations for Cruise 1 of 1978.

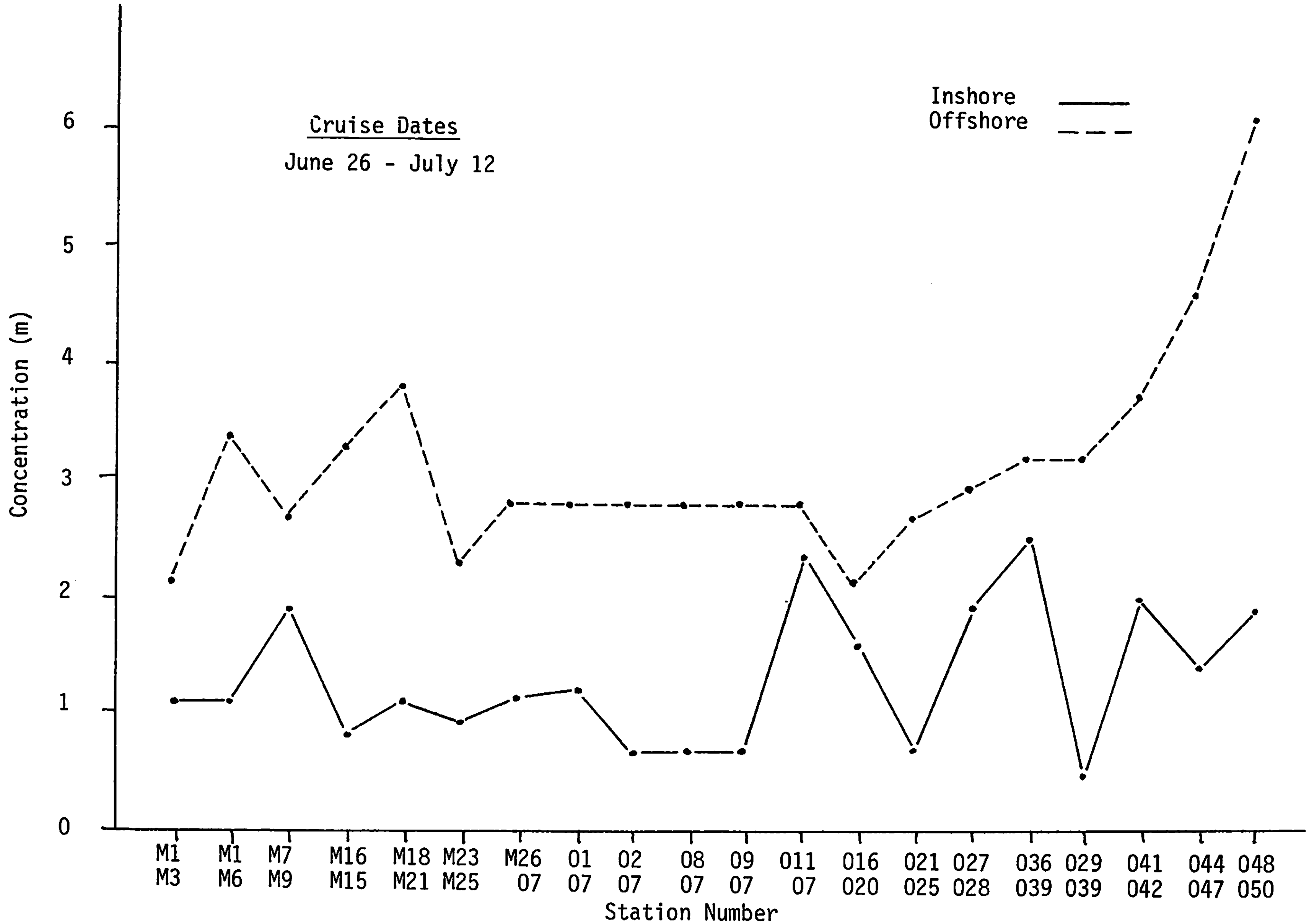


Figure 17. Extinction Depth at Inshore and Offshore Stations for Cruise 2 of 1978.

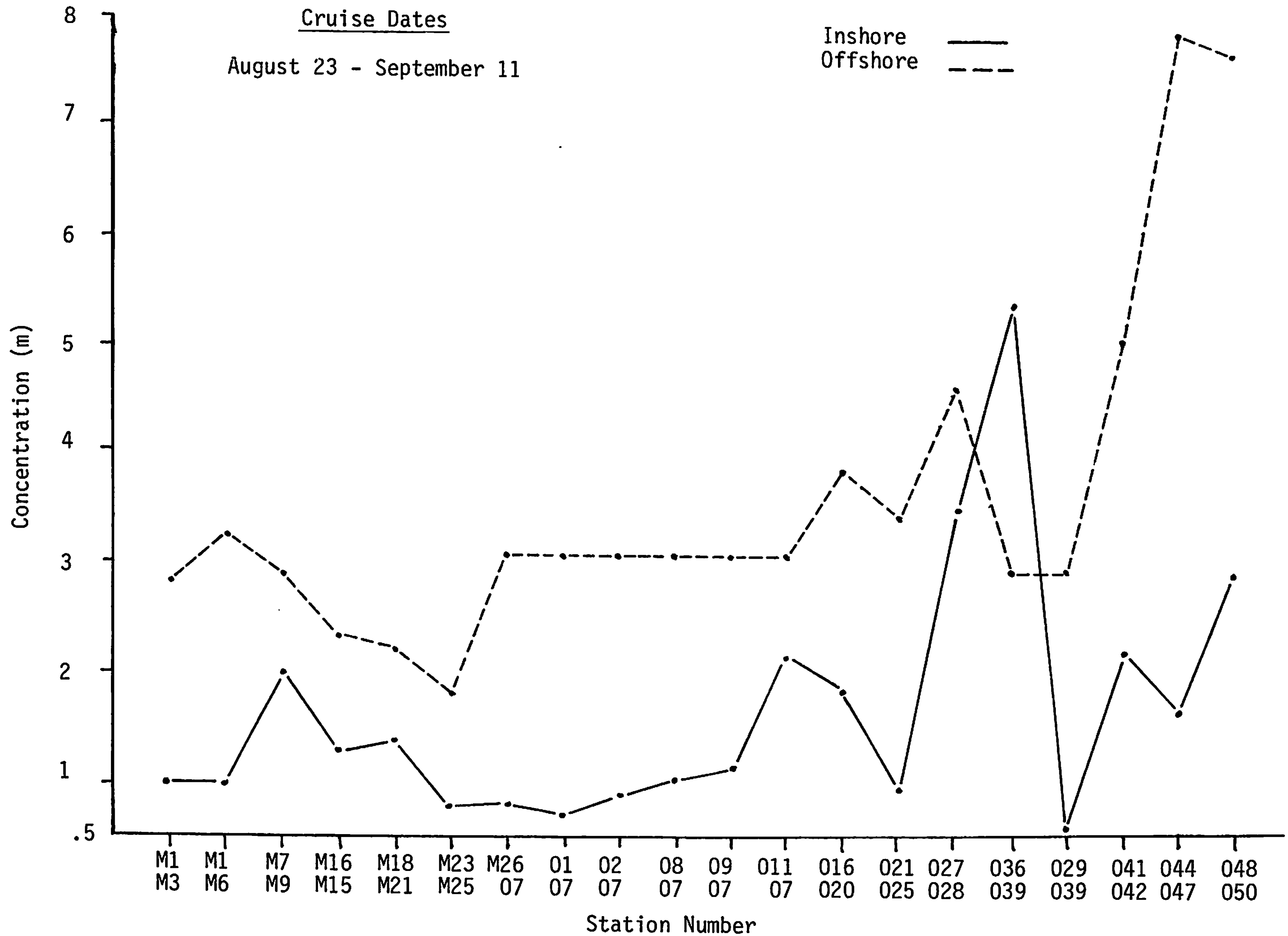


Figure18. Extinction Depth at Inshore and Offshore Stations for Cruise 3 of 1978.

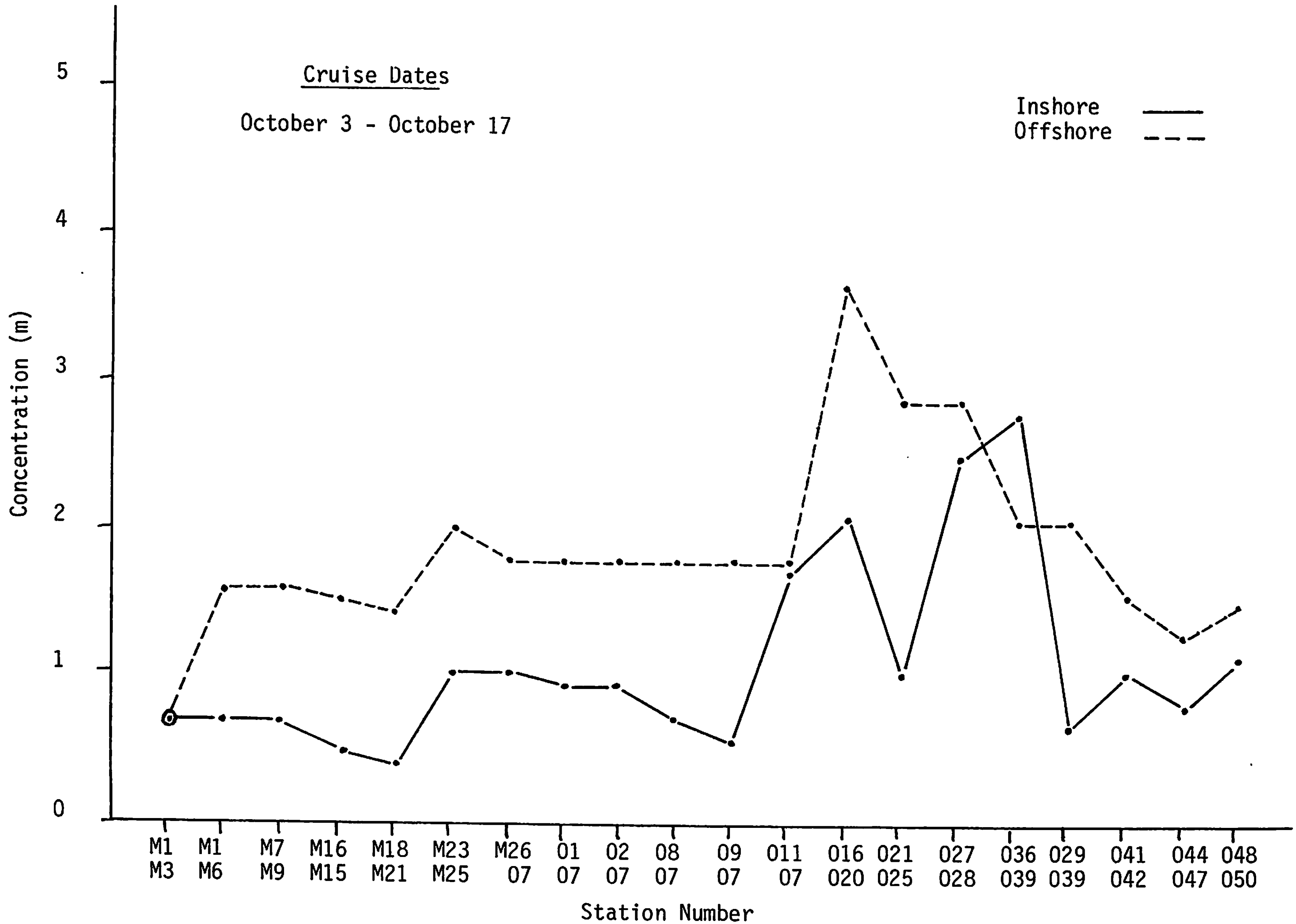


Figure 19. Extinction Depth at Inshore and Offshore Stations for Cruise 4 of 1978.

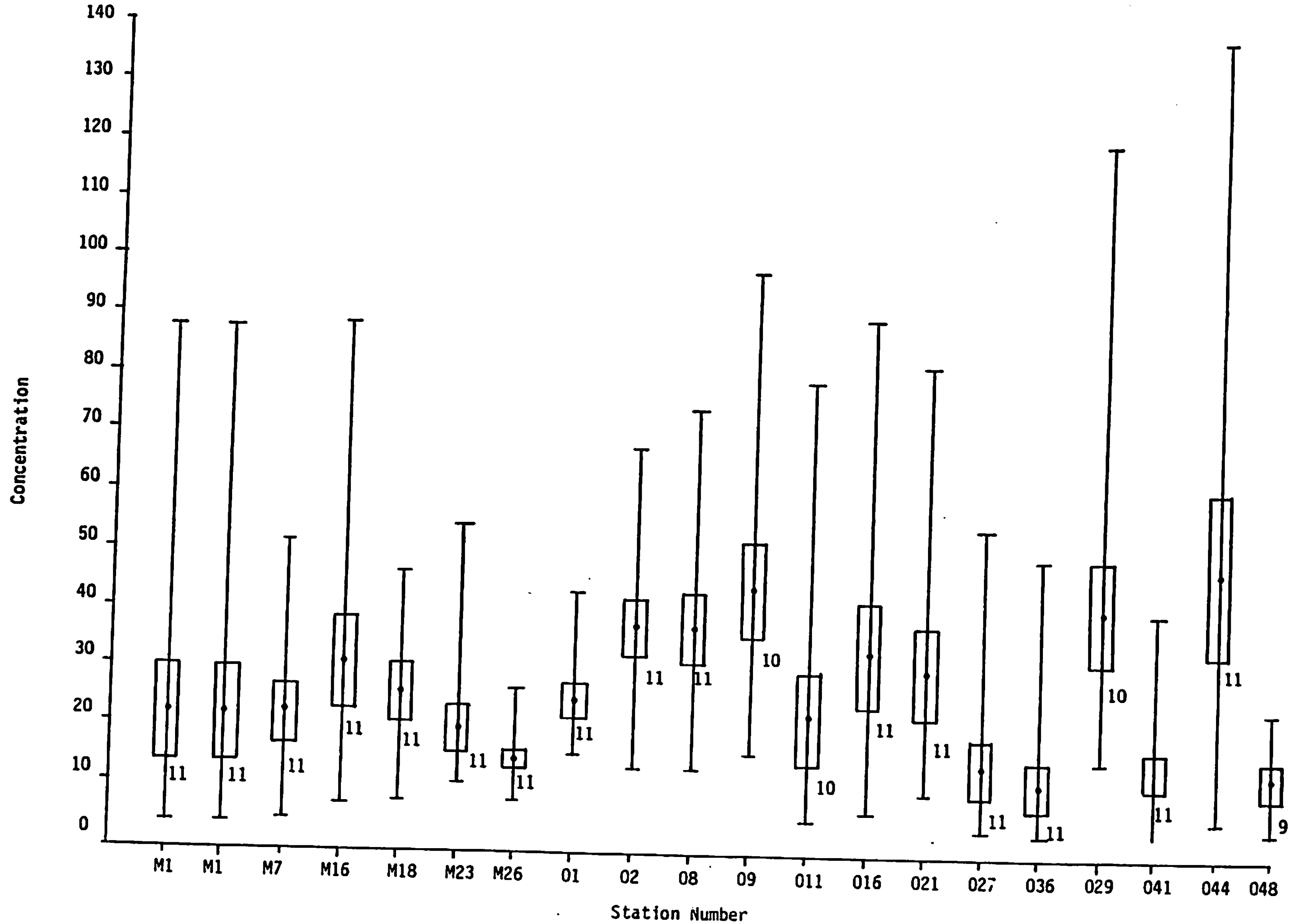


Figure 20. Annual average Turbidity at Inshore Stations in 1978.

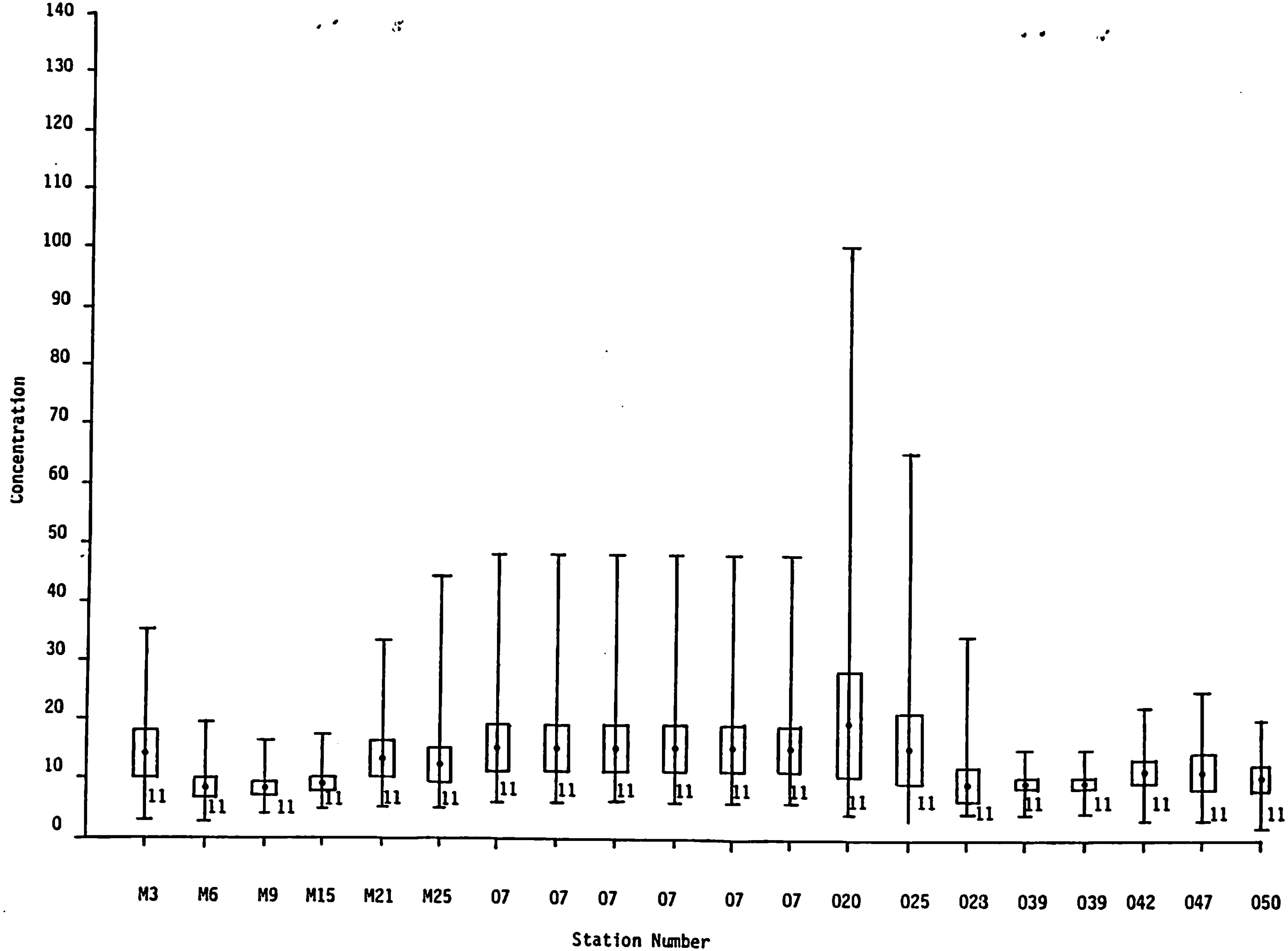


Figure 21. Annual Average Turbidity at Offshore Stations in 1978.

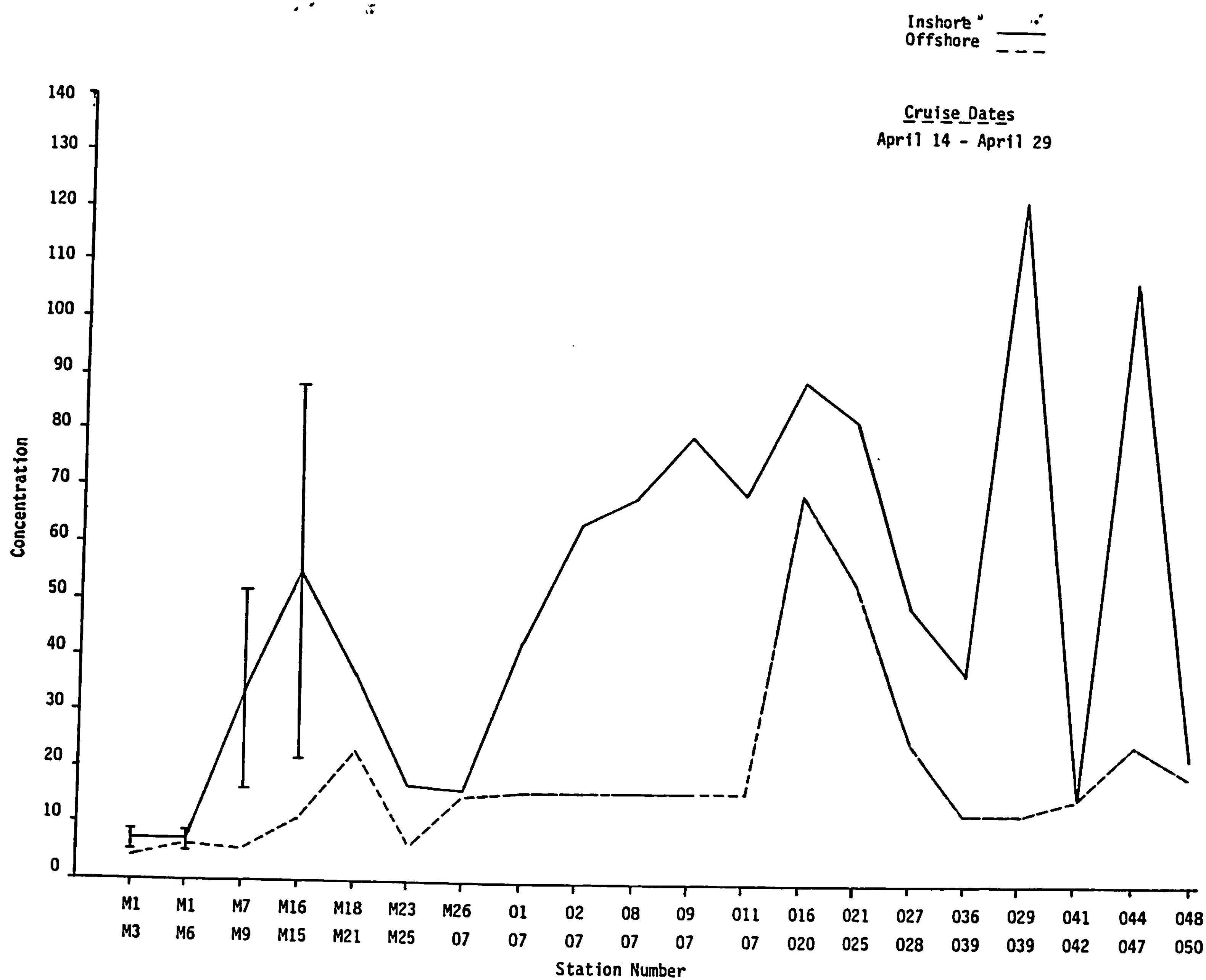


Figure22 Turbidity at Inshore and Offshore Stations for Cruise 1 of 1978.

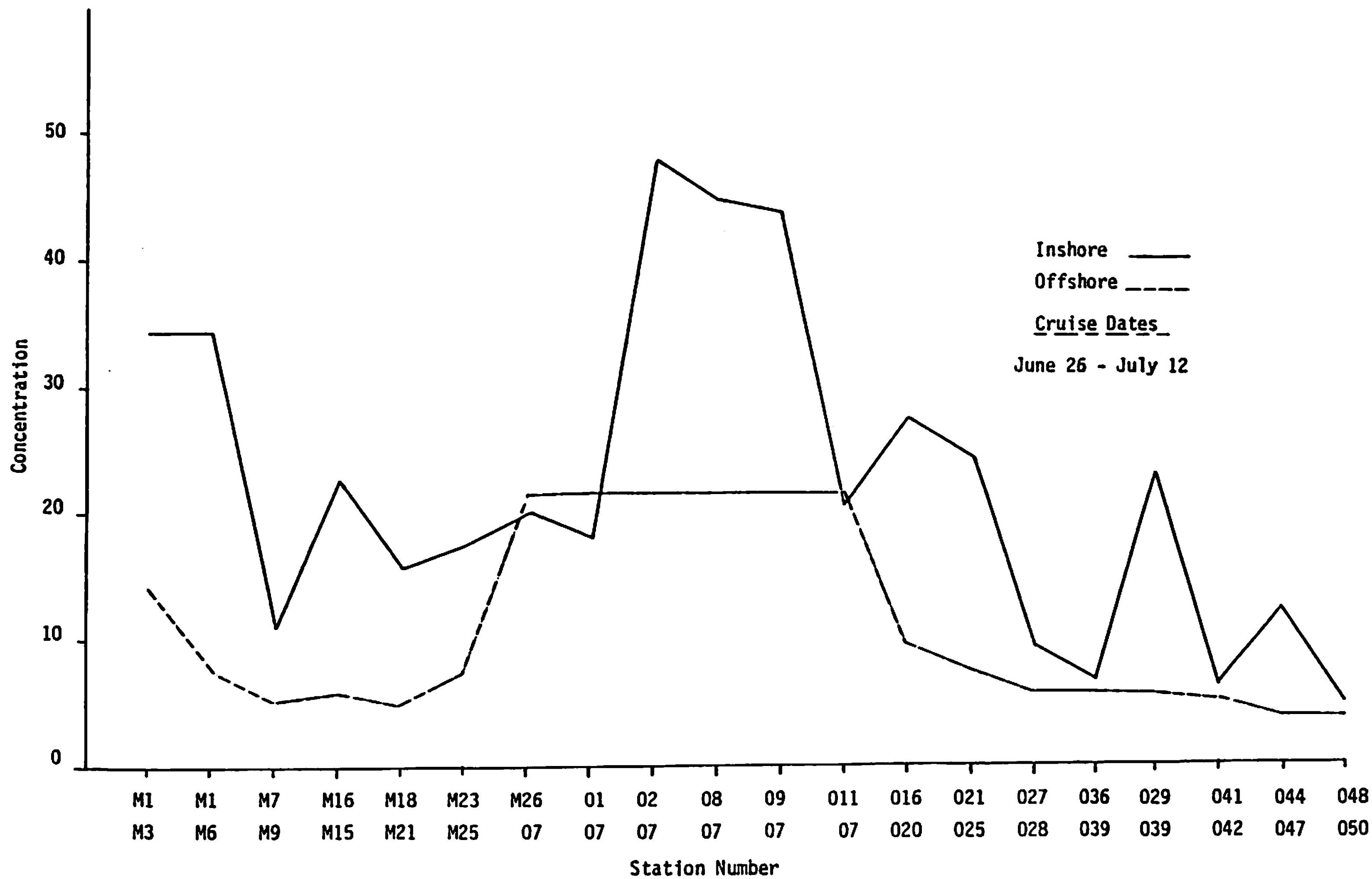


Figure 23 Turbidity at Inshore and Offshore Stations for Cruise 2 of 1978.

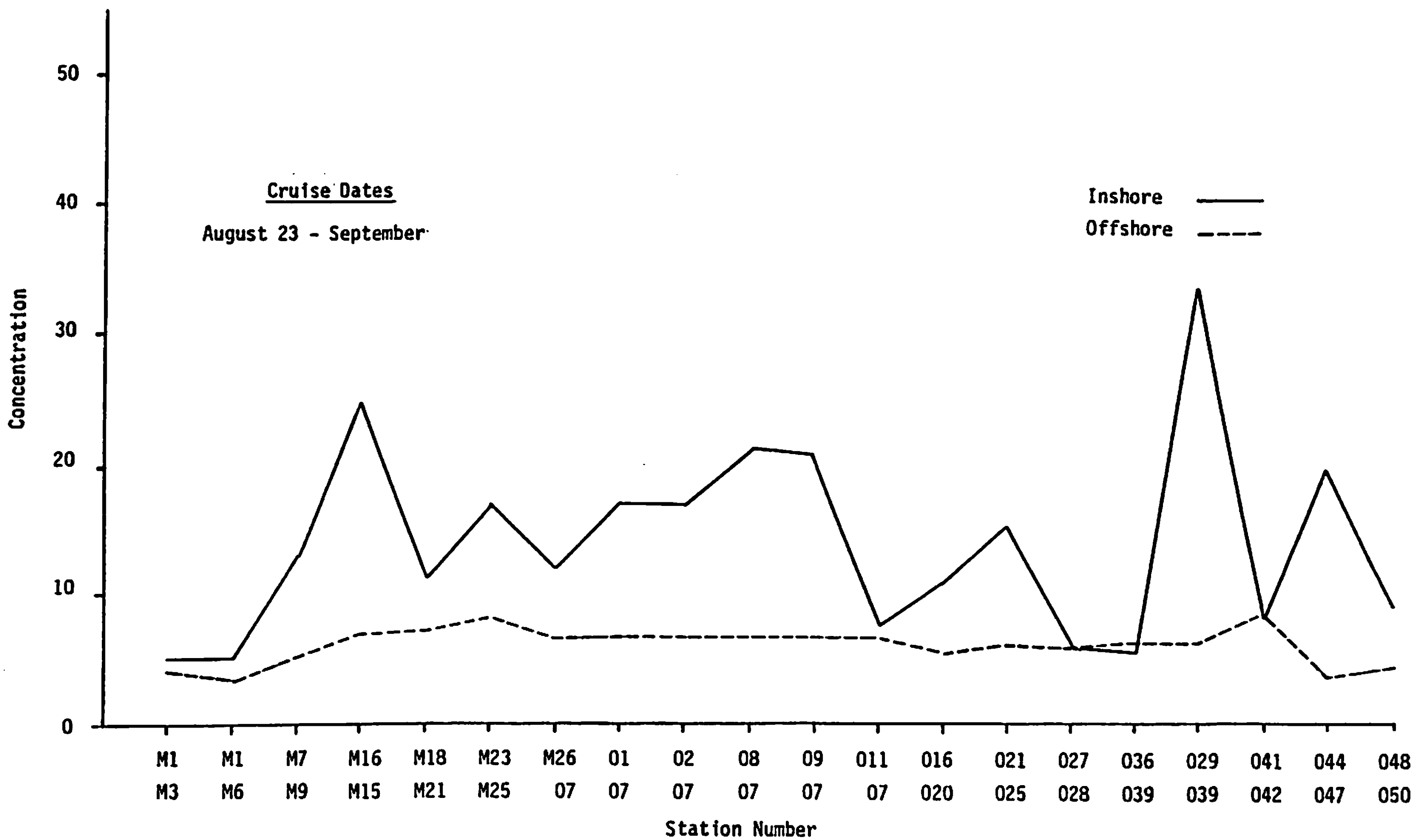


Figure 24. Turbidity at Inshore and Offshore Stations for Cruise 3 of 1978.

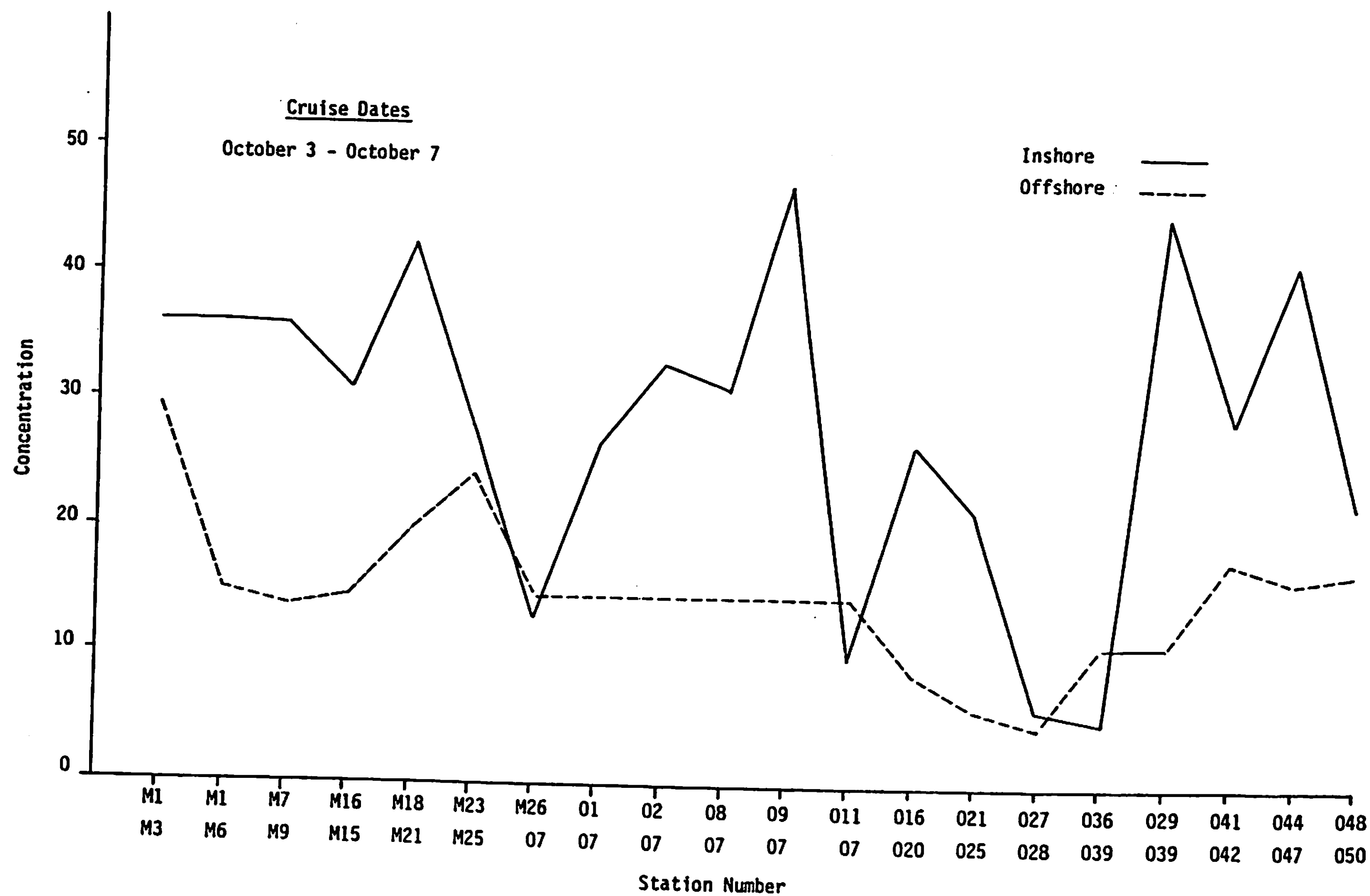


Figure 25. Turbidity at Inshore and Offshore Stations for Cruise 4 of 1978.

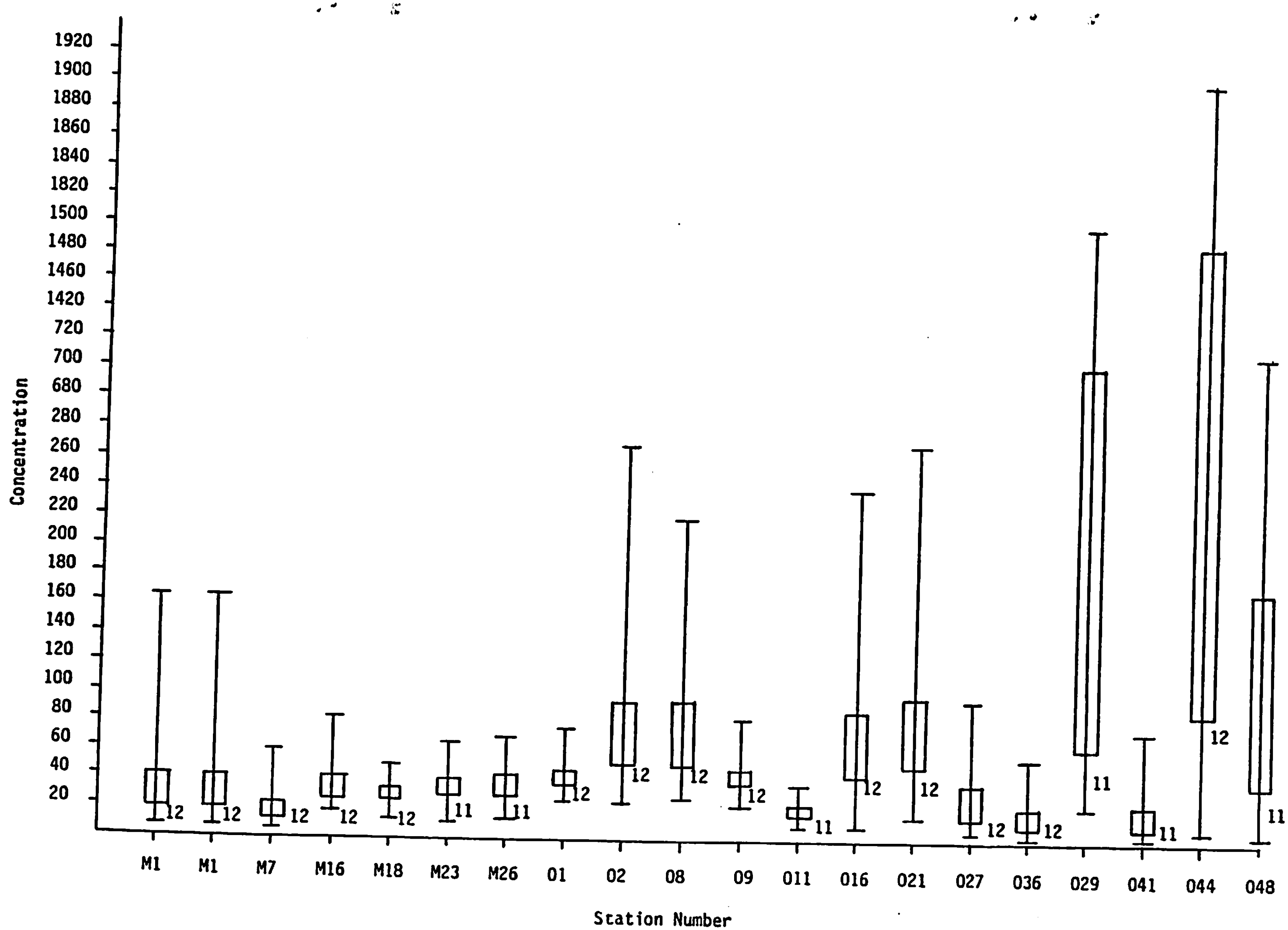


Figure26 Annual Average Turbidity at Inshore Stations in 1979.

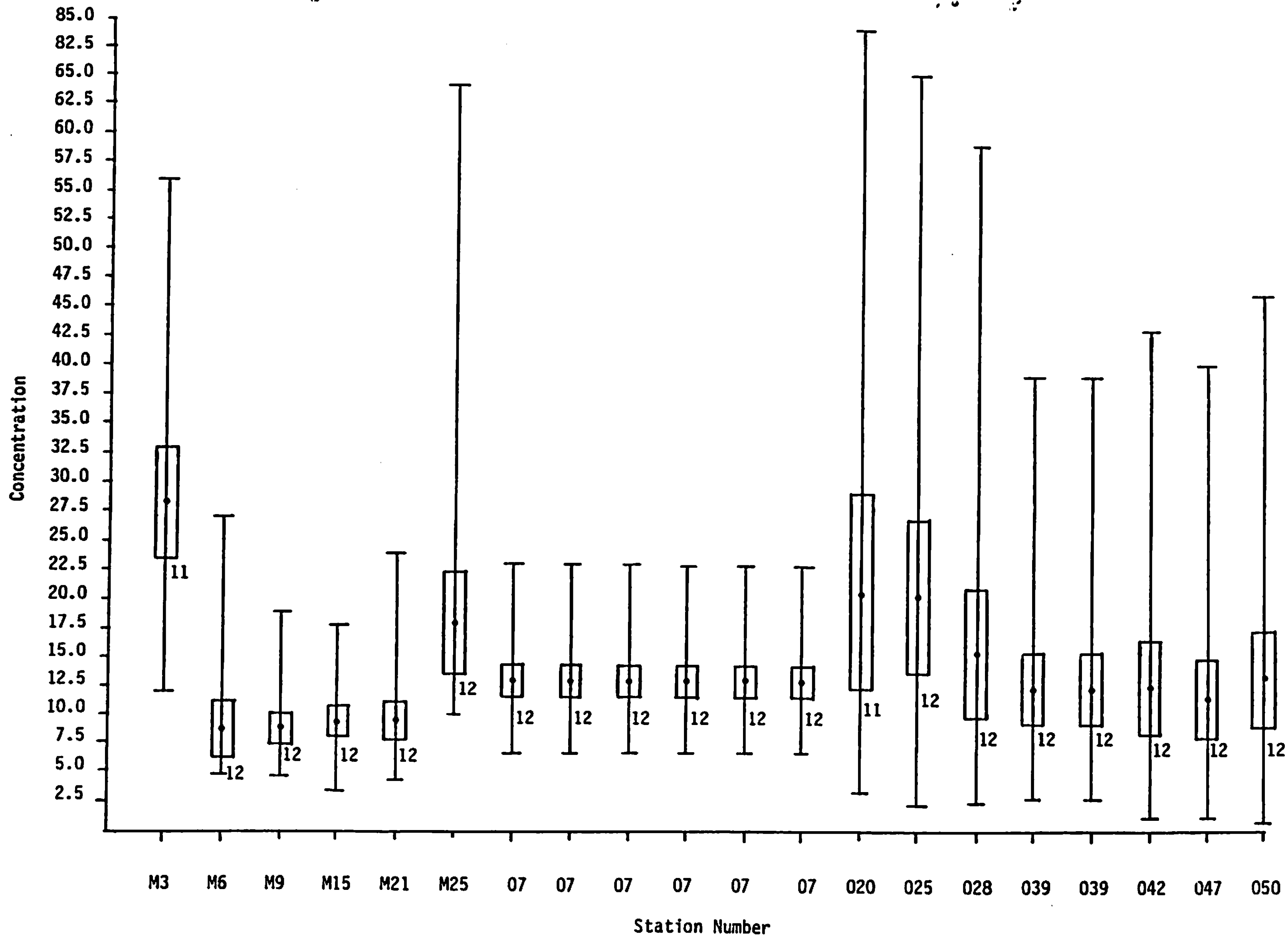


Figure 27. Annual Average Turbidity at Offshore Stations in 1979.

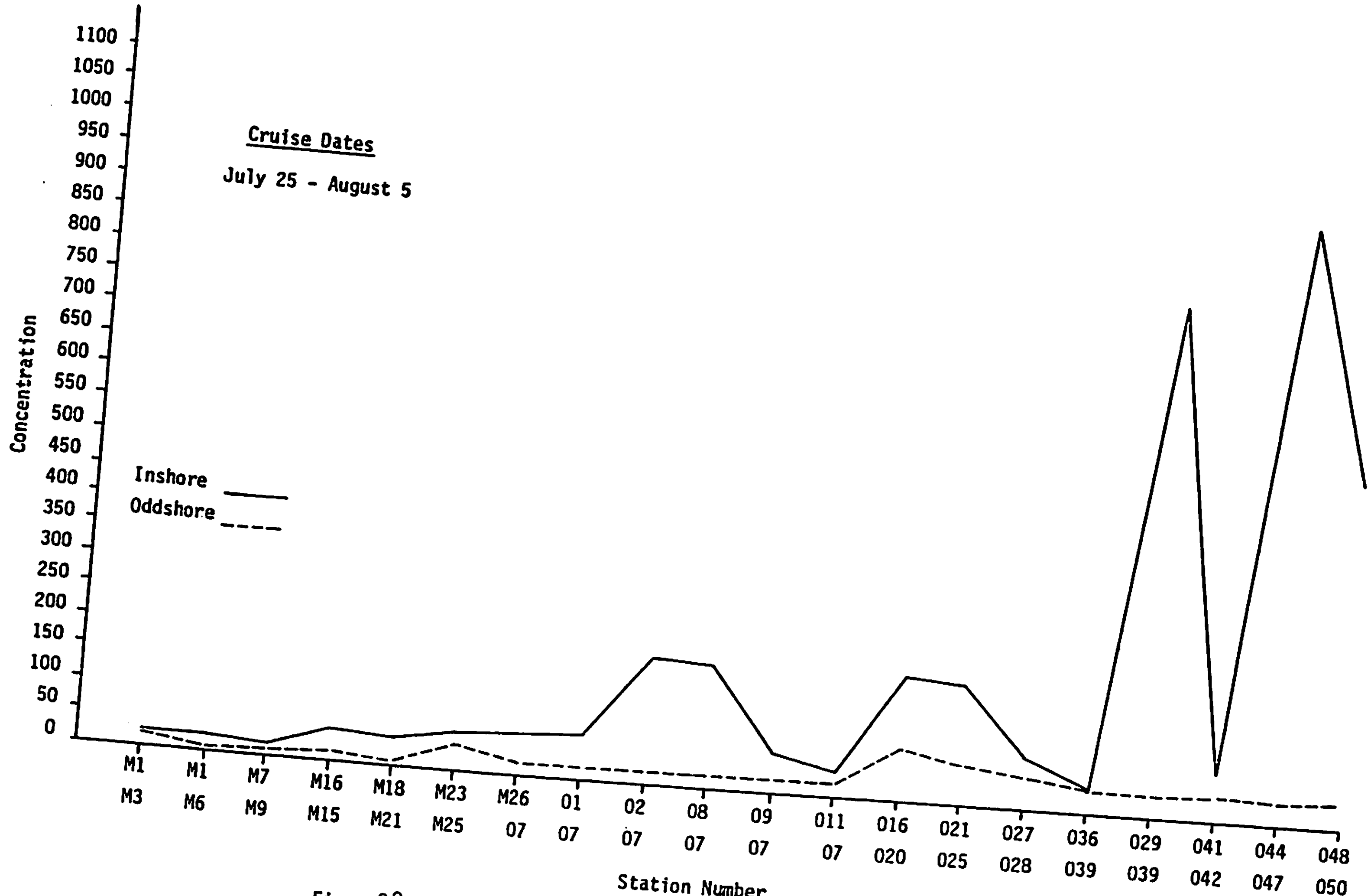


Figure 28. Turbidity Inshore and Offshore Stations for Cruise 1 of 1979.

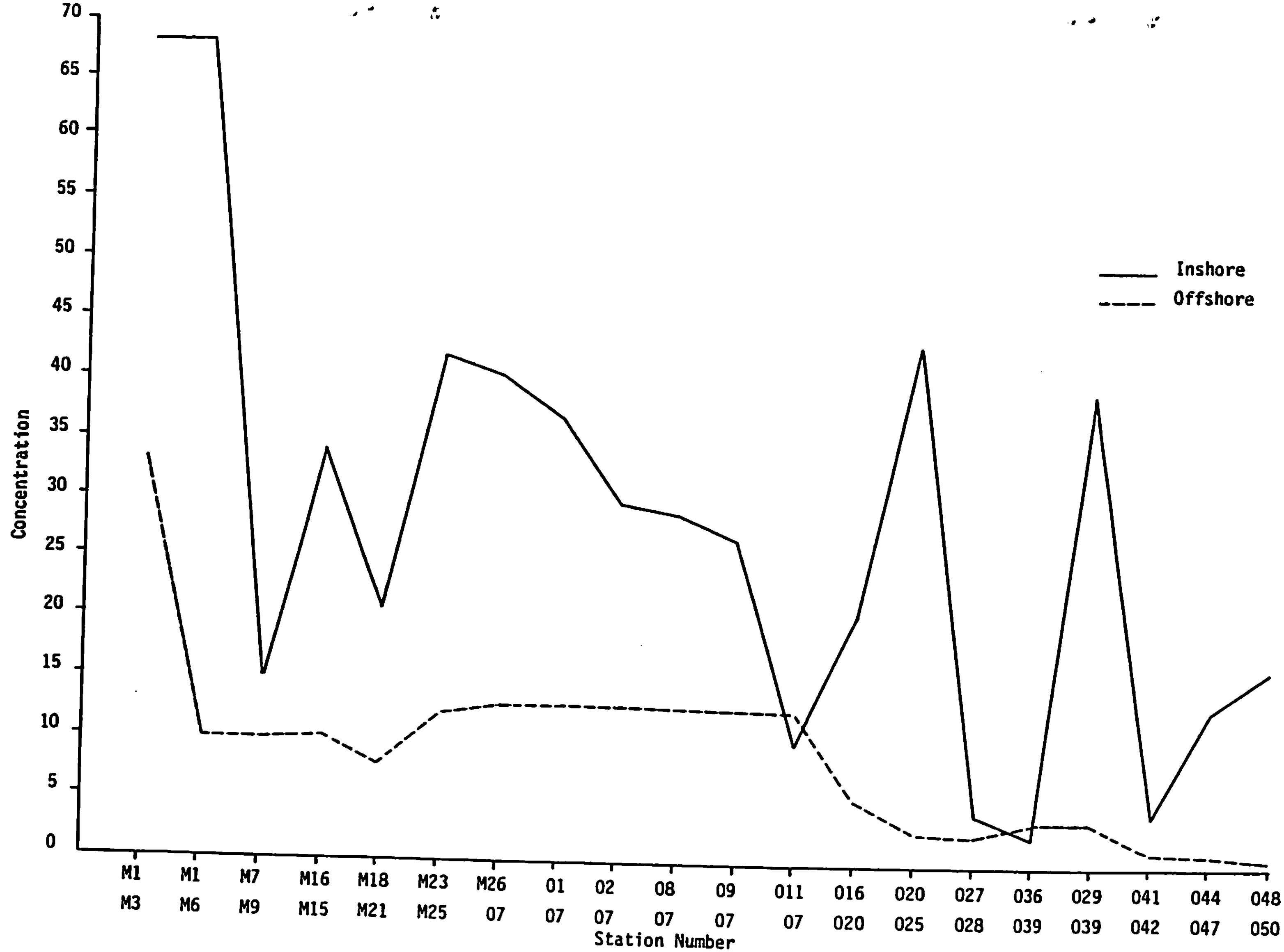


Figure 29. Turbidity at Inshore and Offshore Stations for Cruise 2 of 1979.

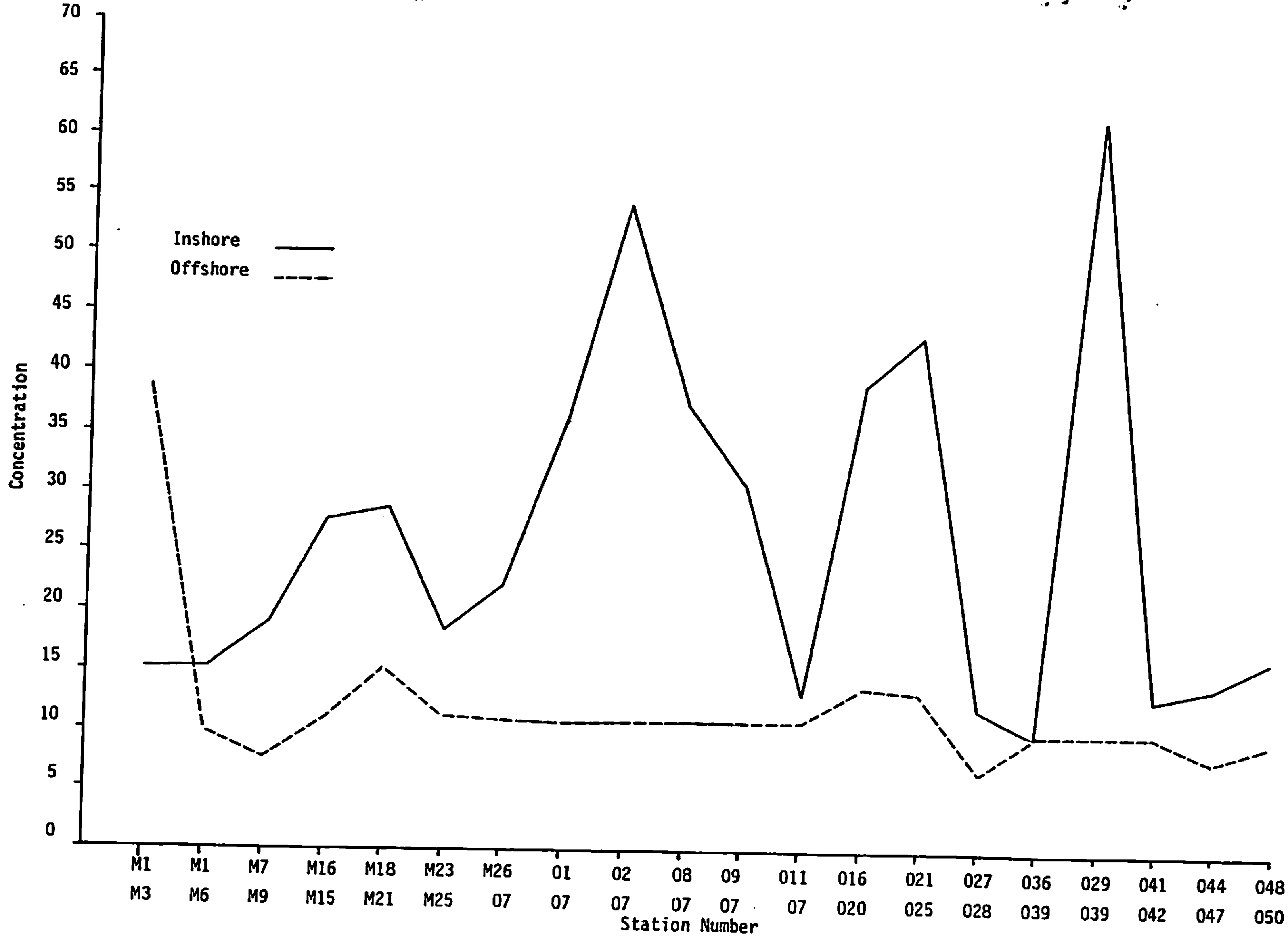


Figure 30. Turbidity at Inshore and Offshore Stations for Cruise 3 of 1979.

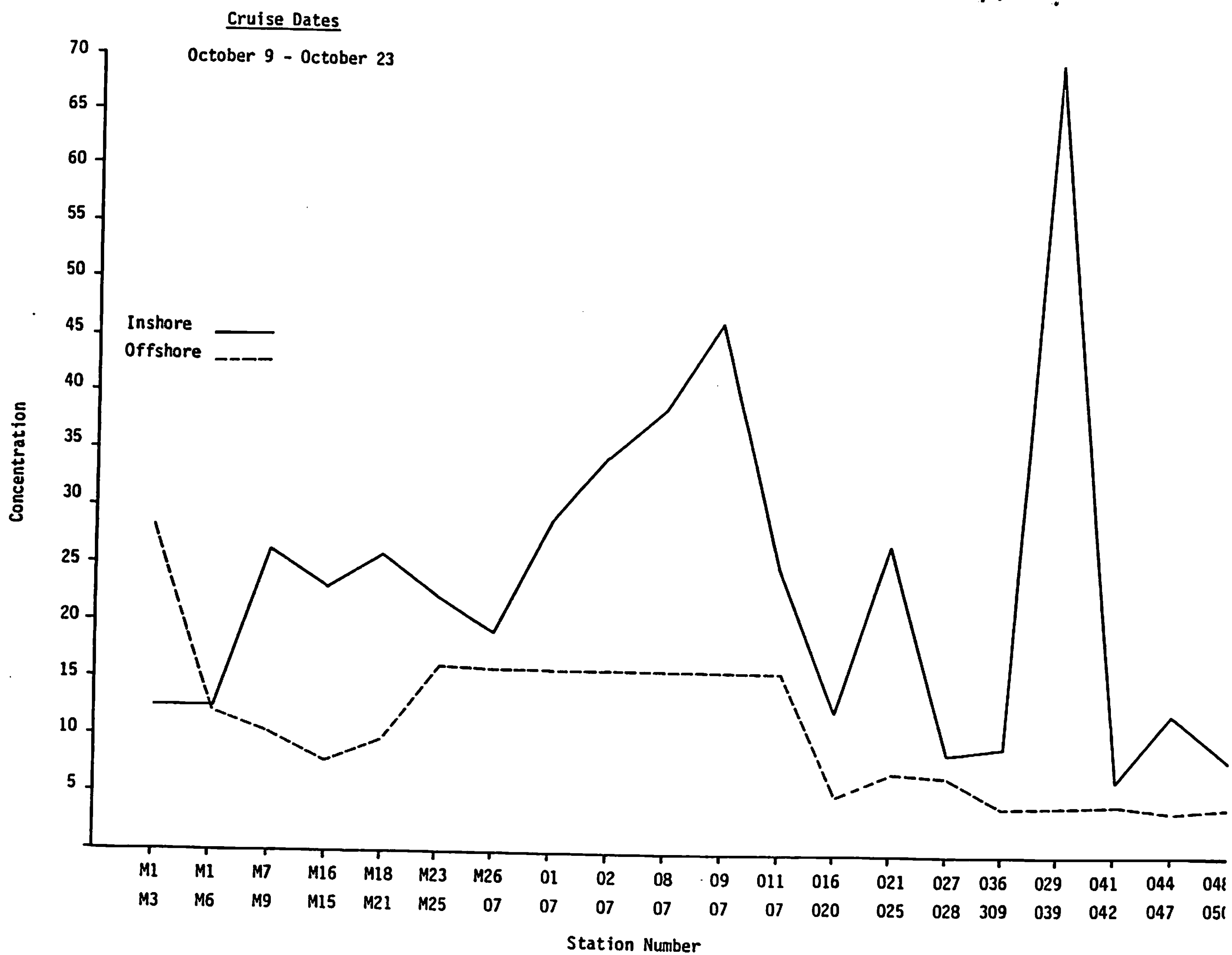


Figure 31. Turbidity at Inshore and Offshore Stations for Cruise 4 of 1979.

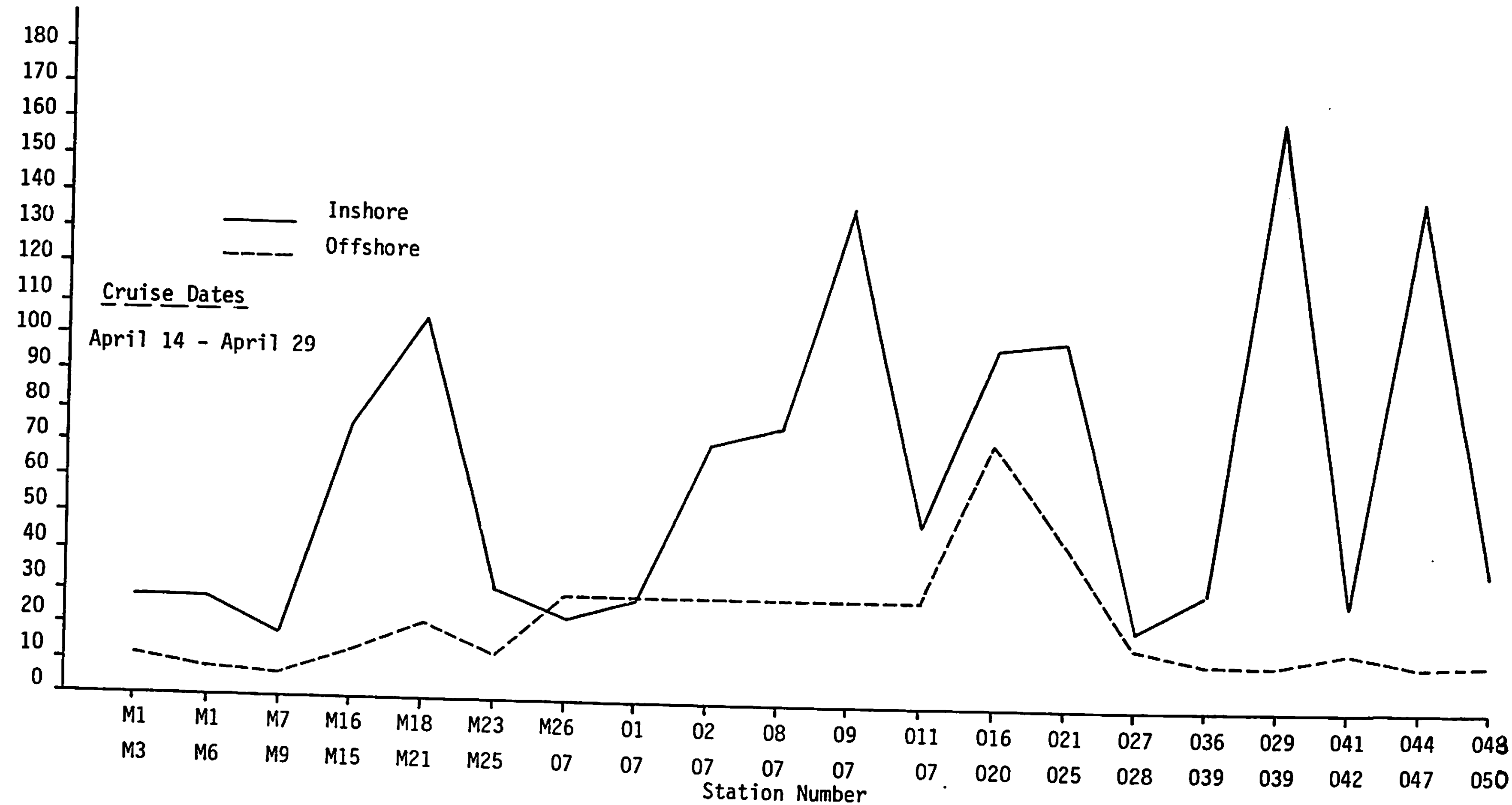


Figure 32. Total Suspended Solids at Inshore and Offshore Stations for Cruise 1 of 1978.

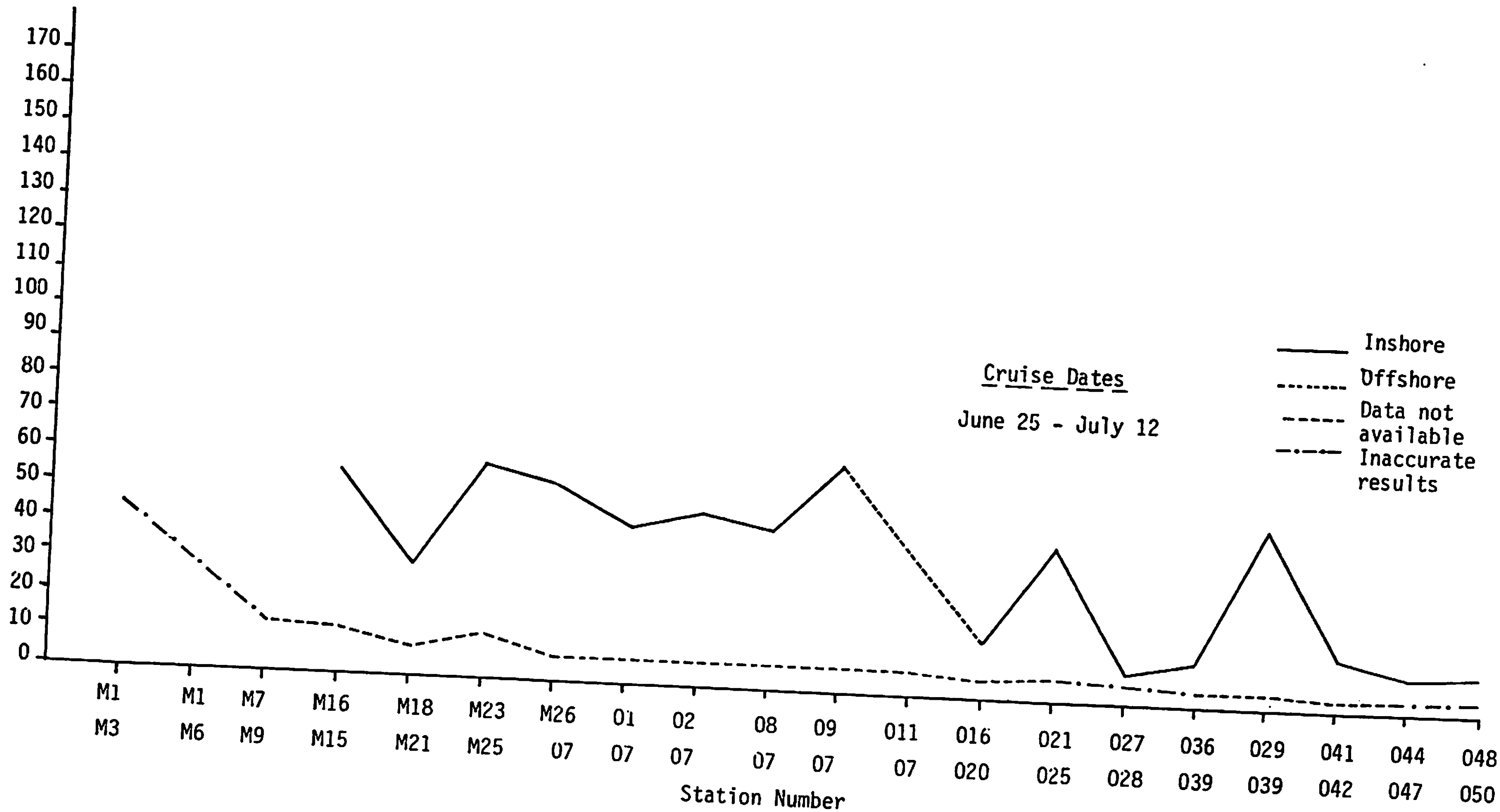


Figure33. Total Suspended Solids at Inshore and Offshore Stations for Cruise 2 of 1978.

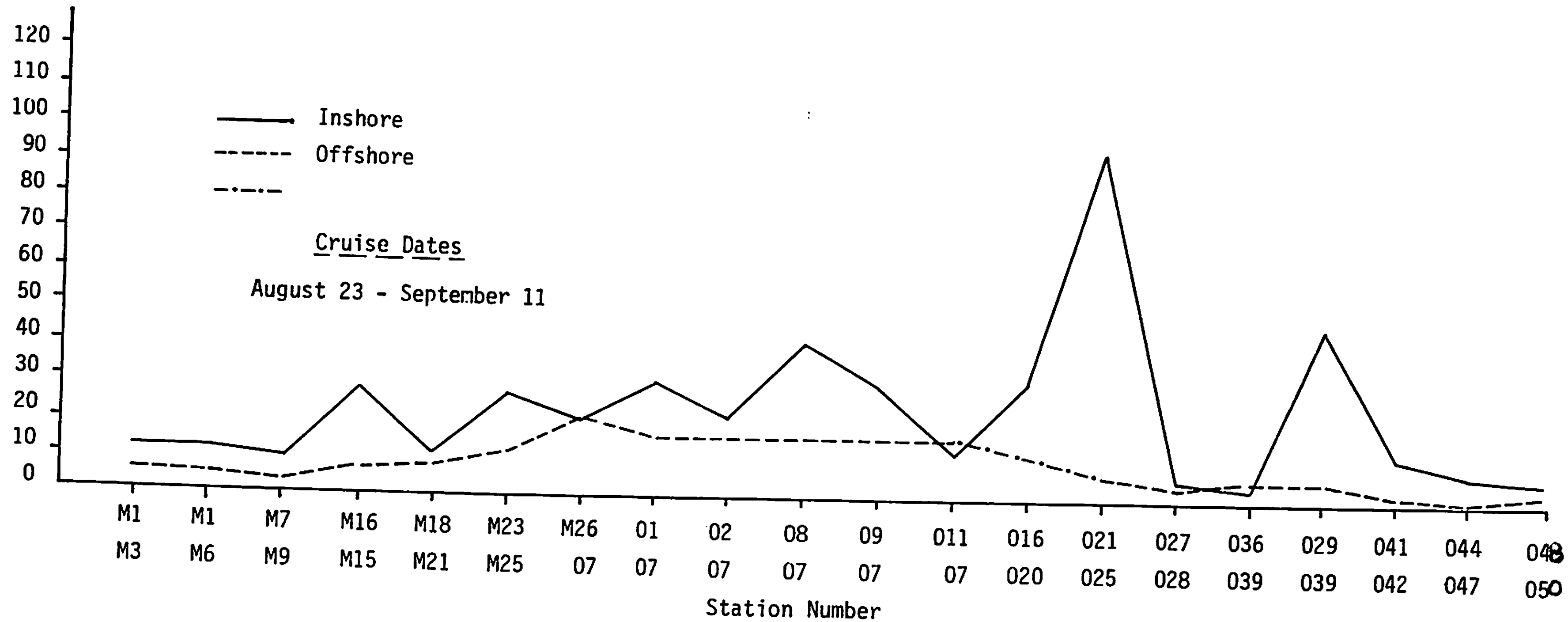


Figure 34. Total Suspended Solids at Inshore and Offshore Stations for Cruise 3 of 1978.

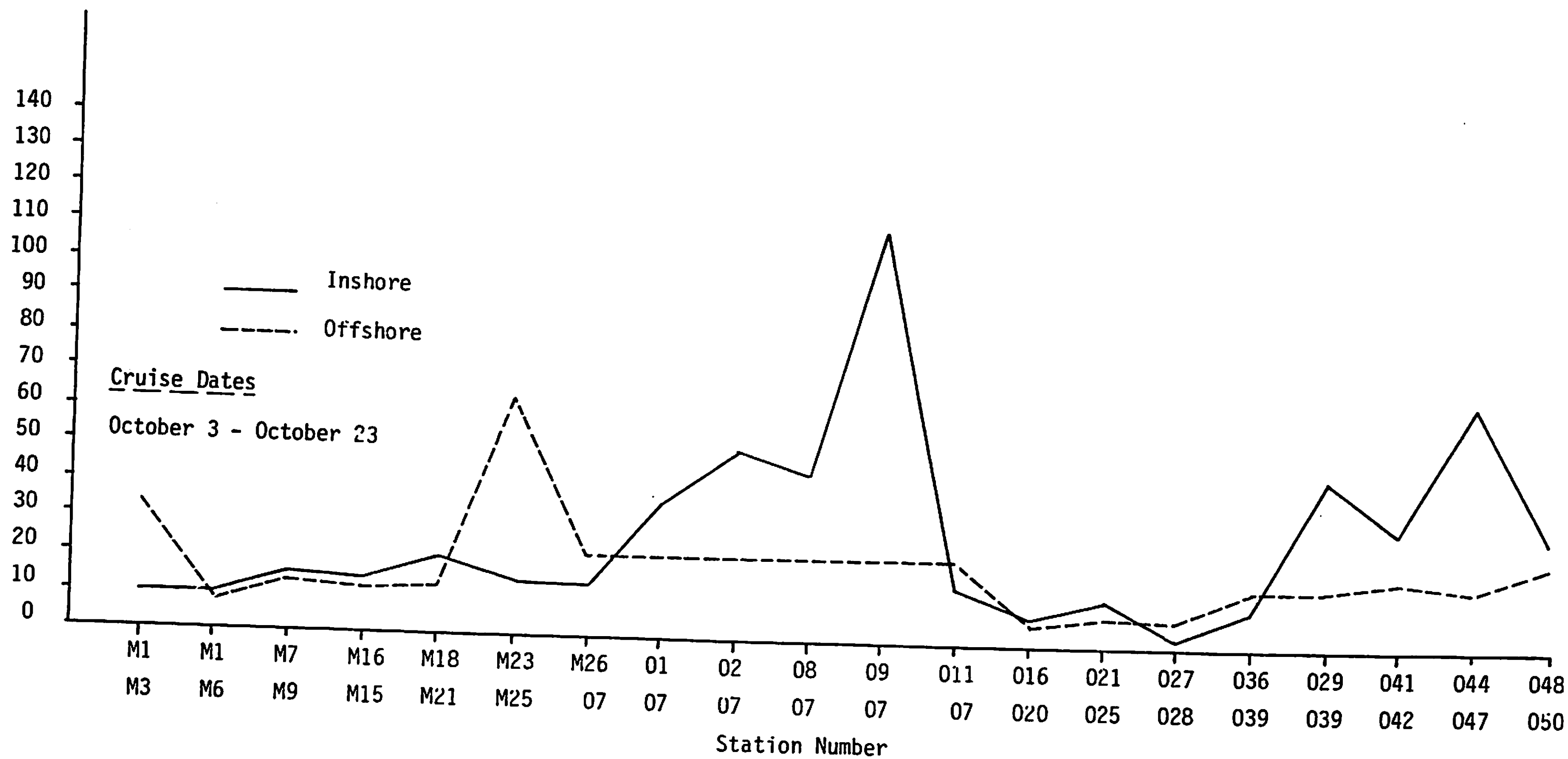


Figure35. Total Suspended Solids at Inshore and Offshore Stations for Cruise 4 of 1978.

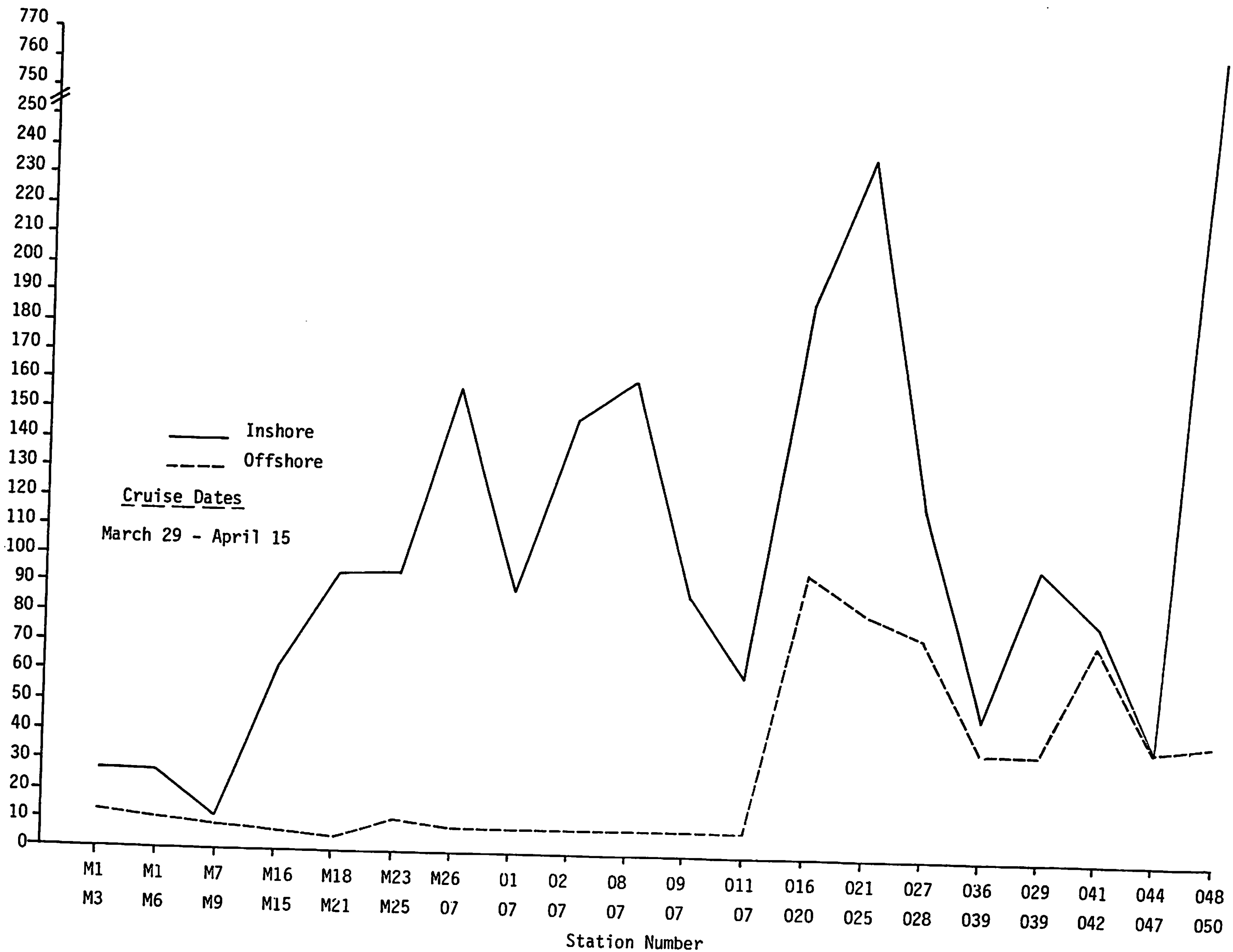


Figure 36 Total Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 1 of 1979.

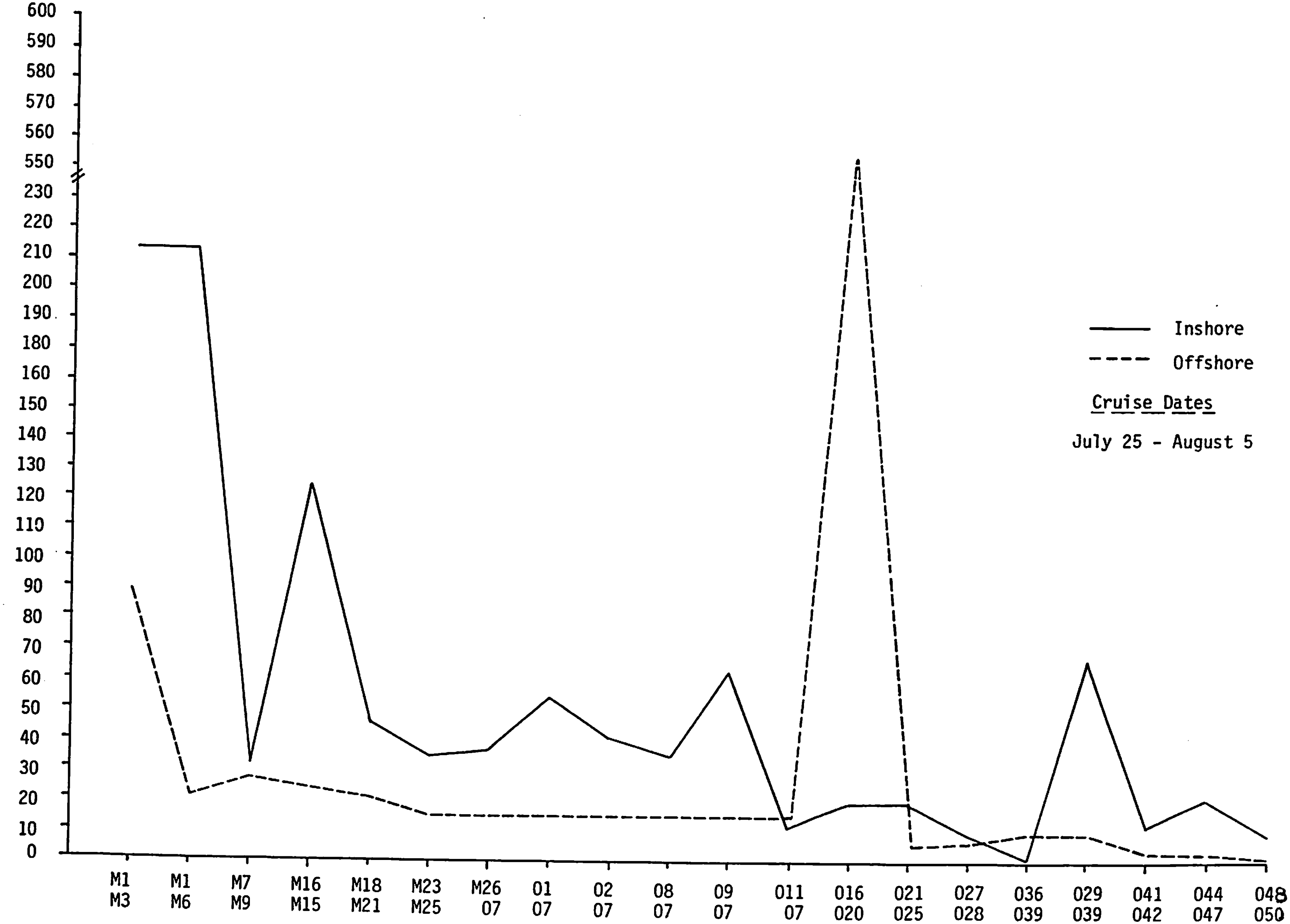


Figure 37 Total Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 2 of 1979.

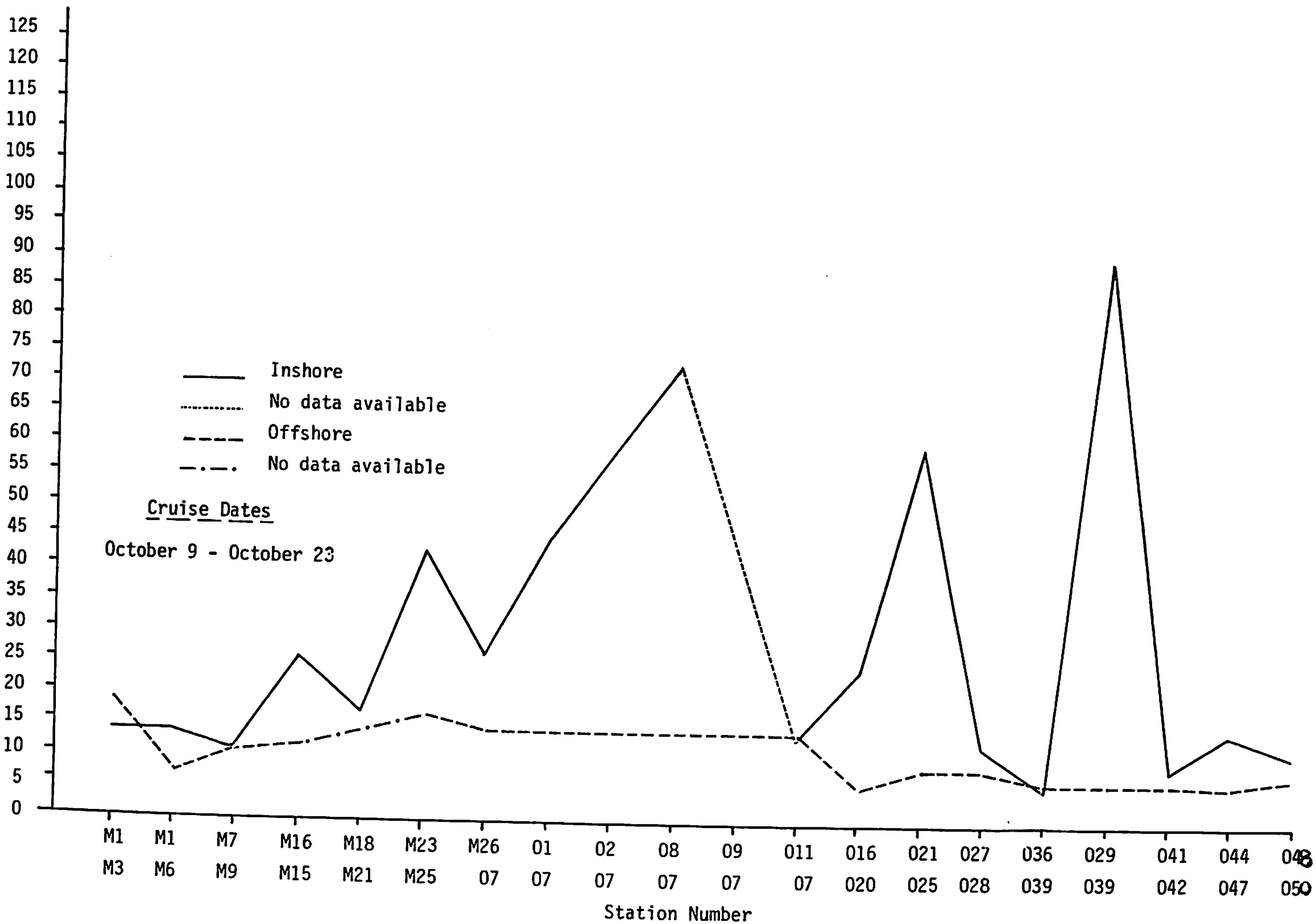


Figure38. Total Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 4 of 1979.

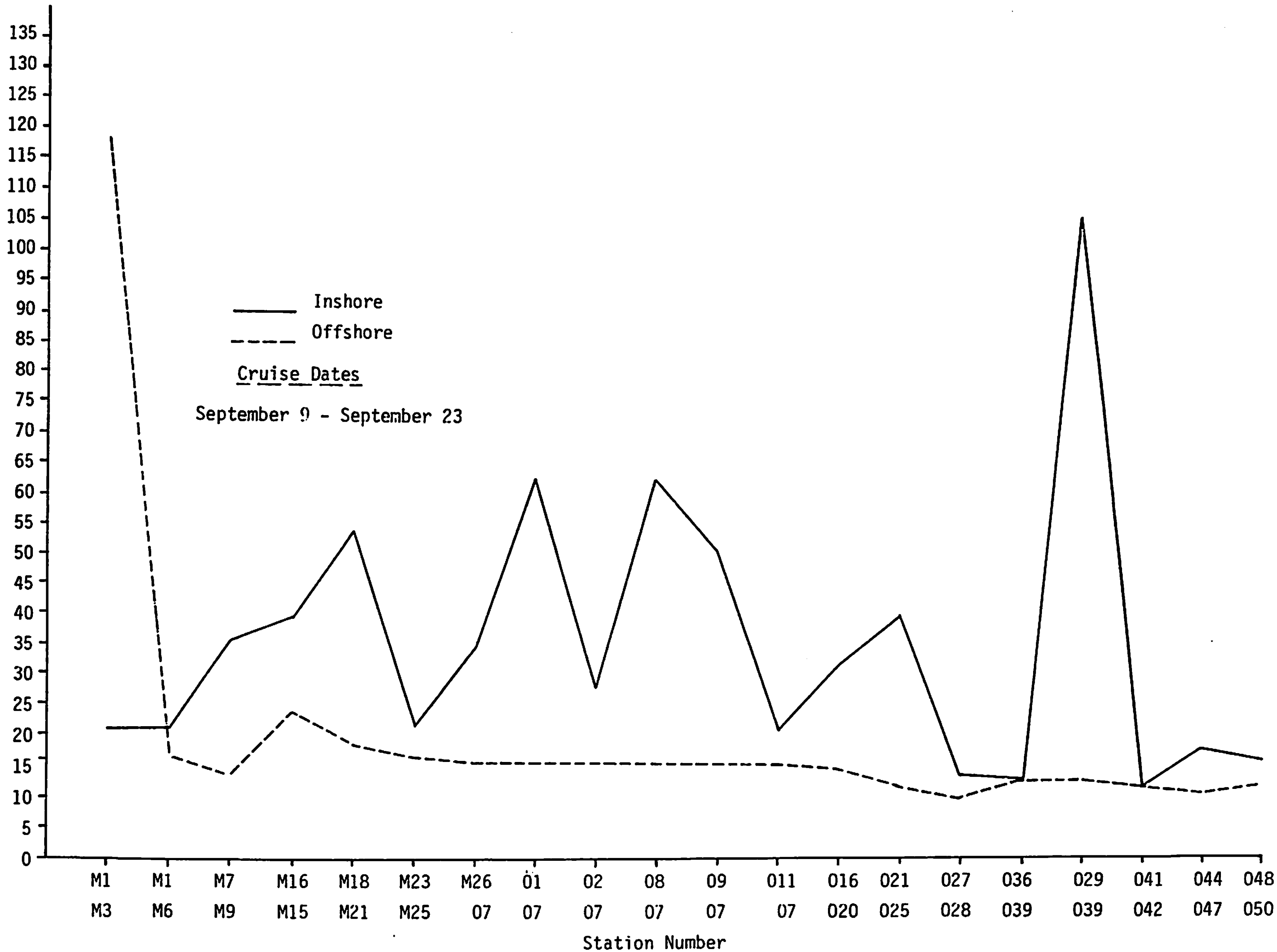


Figure39. Total Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 3 of 1979.

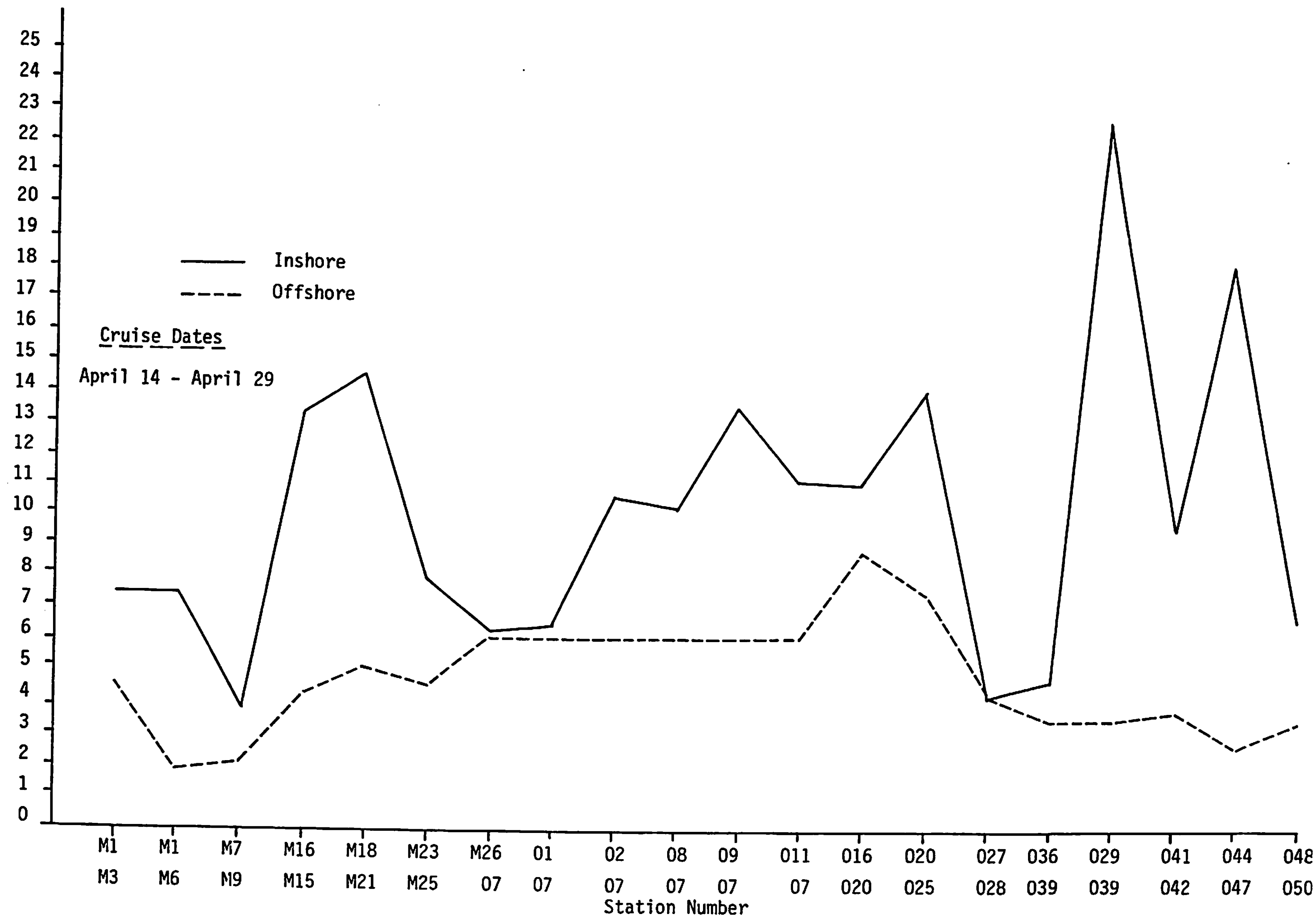


Figure 40. Vclatile Suspended Solids at Inshore and Offshore Stations for Cruise 1 of 1978.

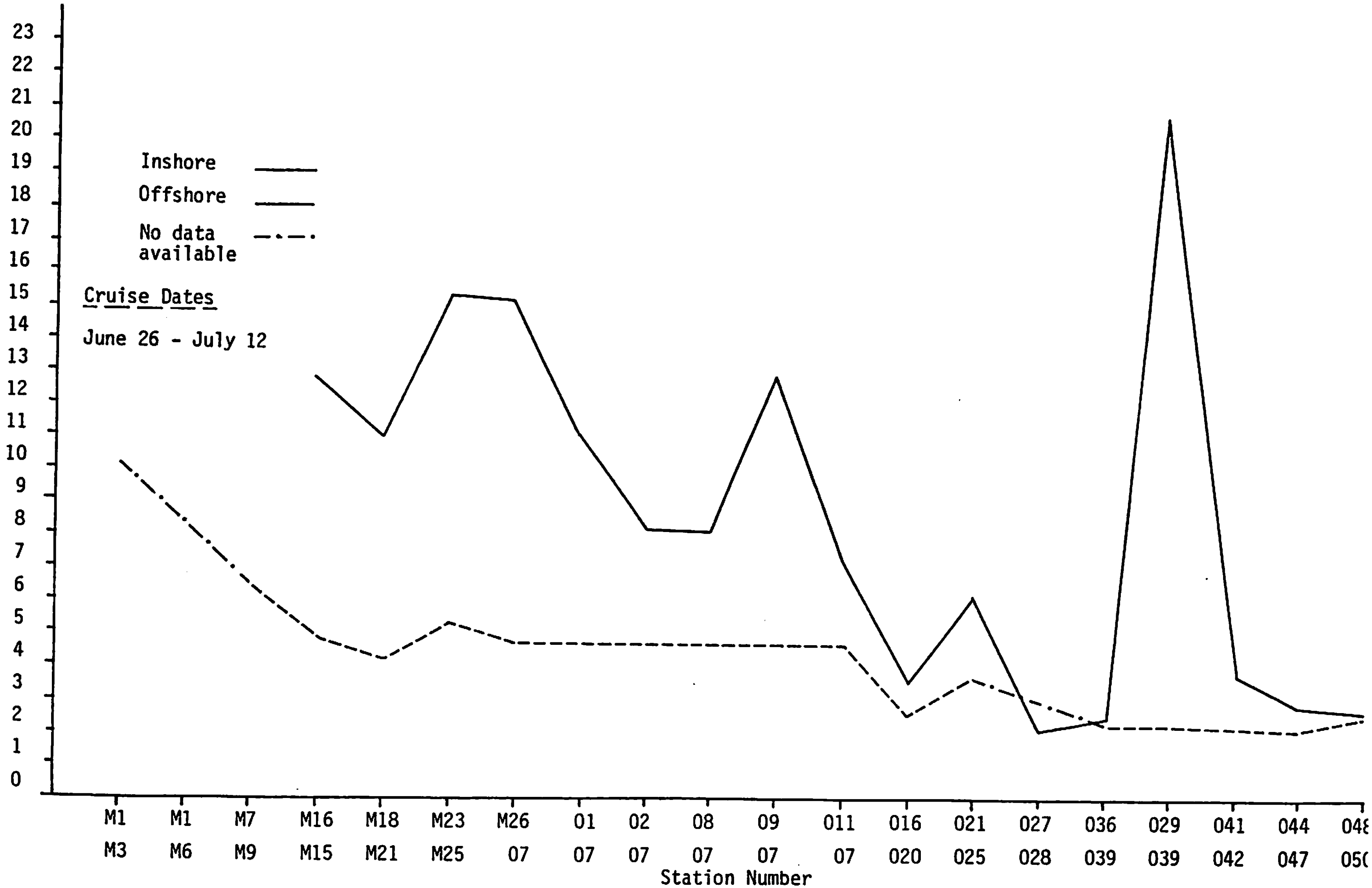


Figure 41. Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 2 of 1978.

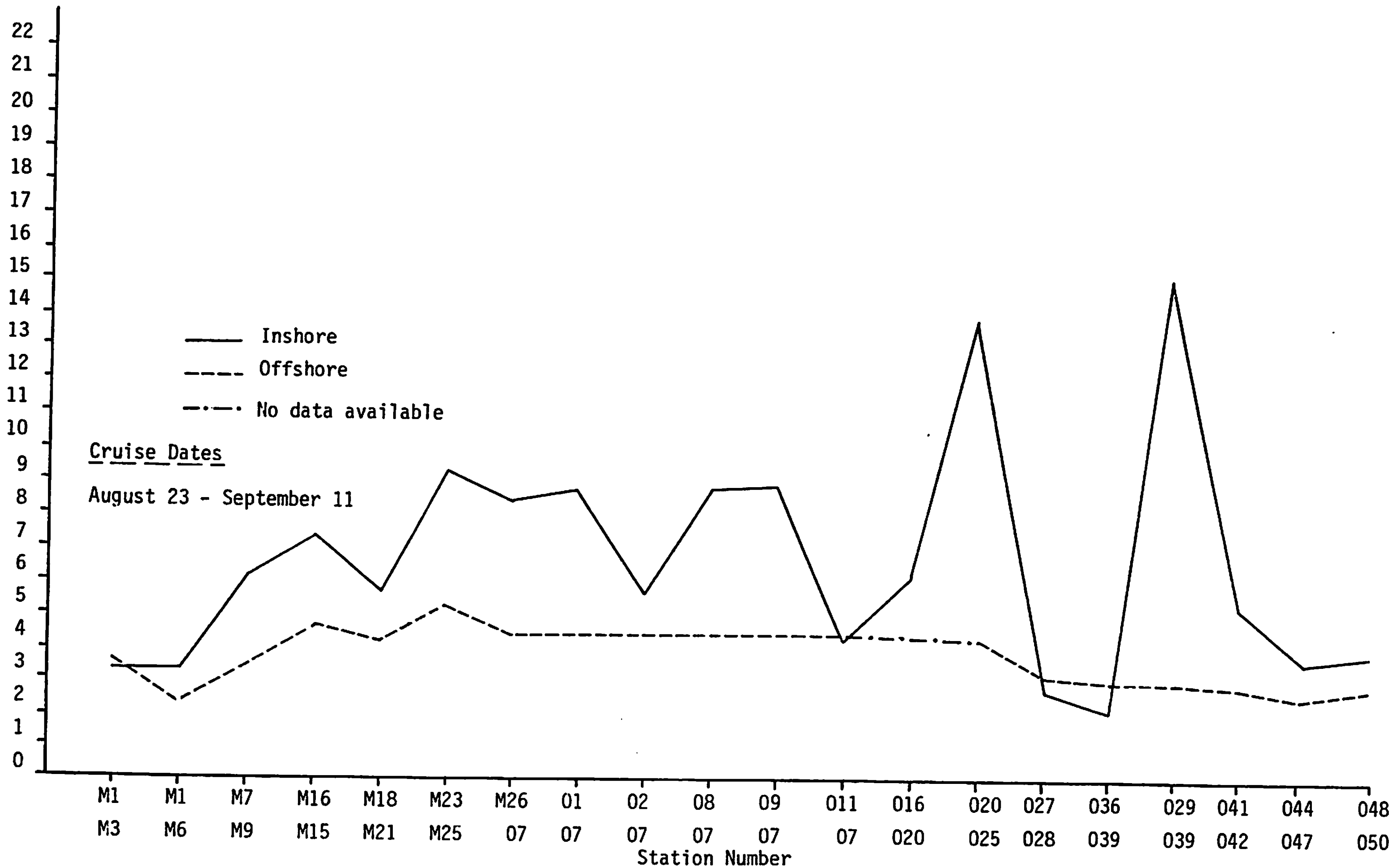


Figure 42 Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 3 of 1978.

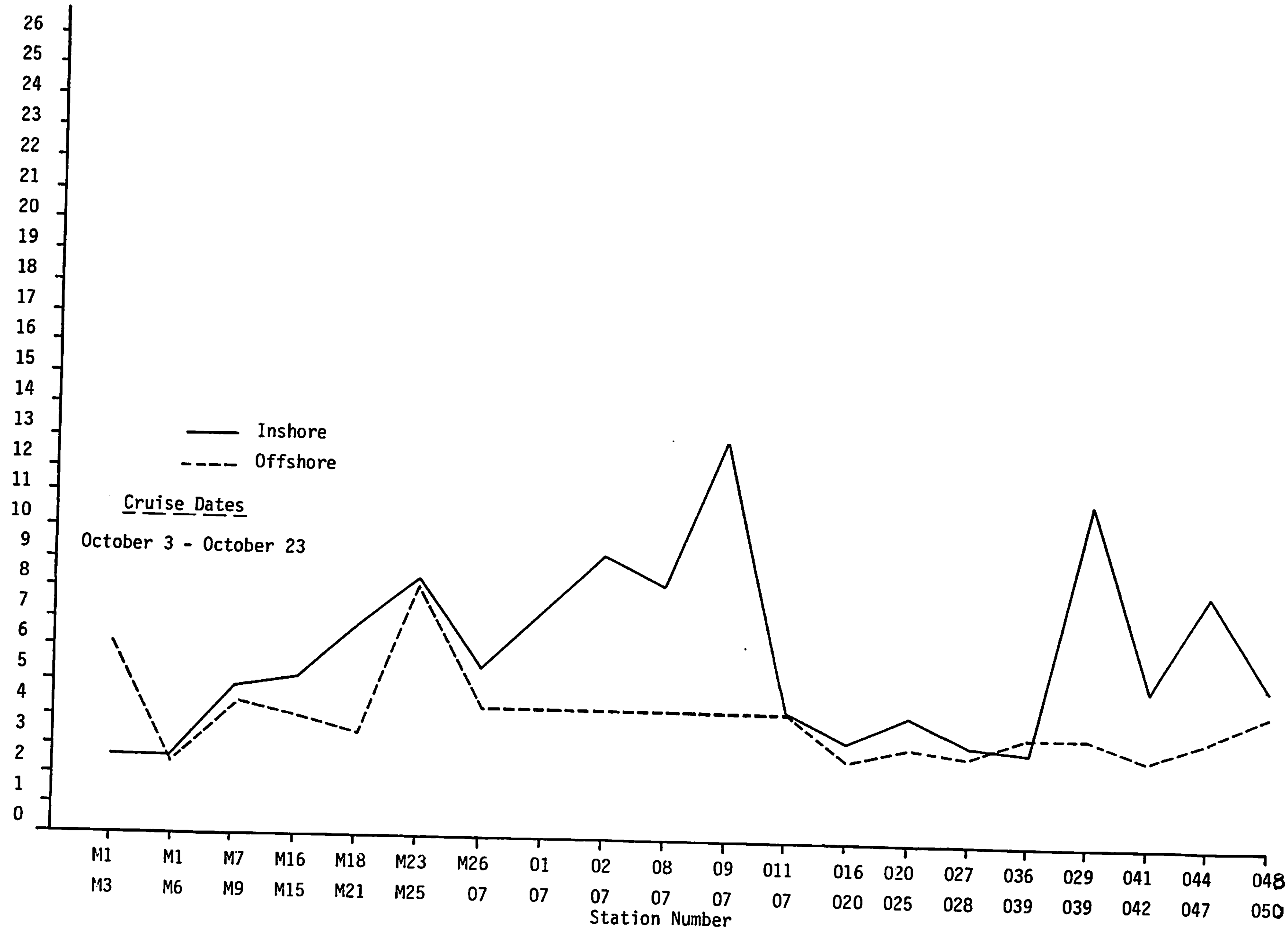


Figure 43. Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 4 of 1978.

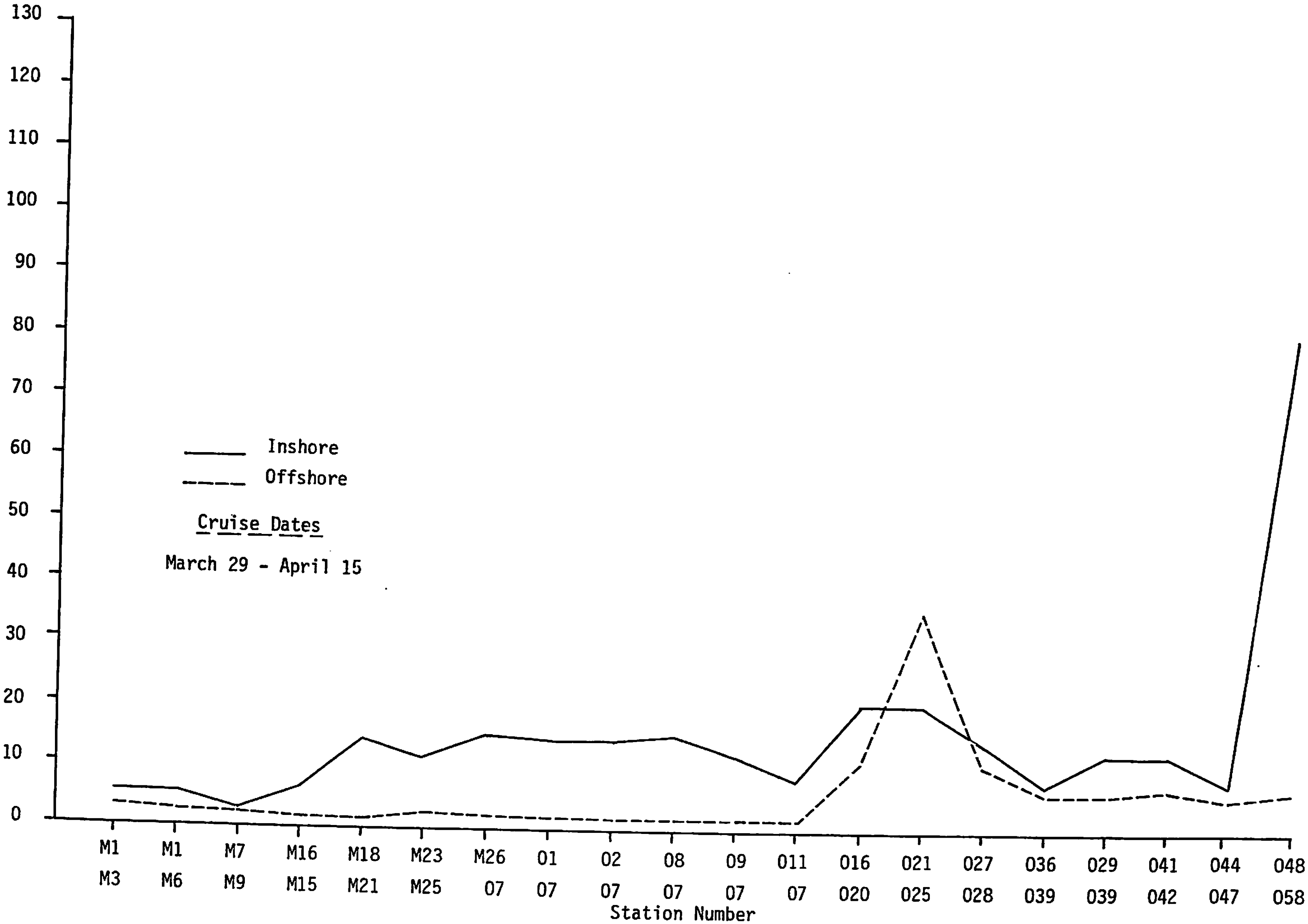


Figure44. Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 1 of 1979.

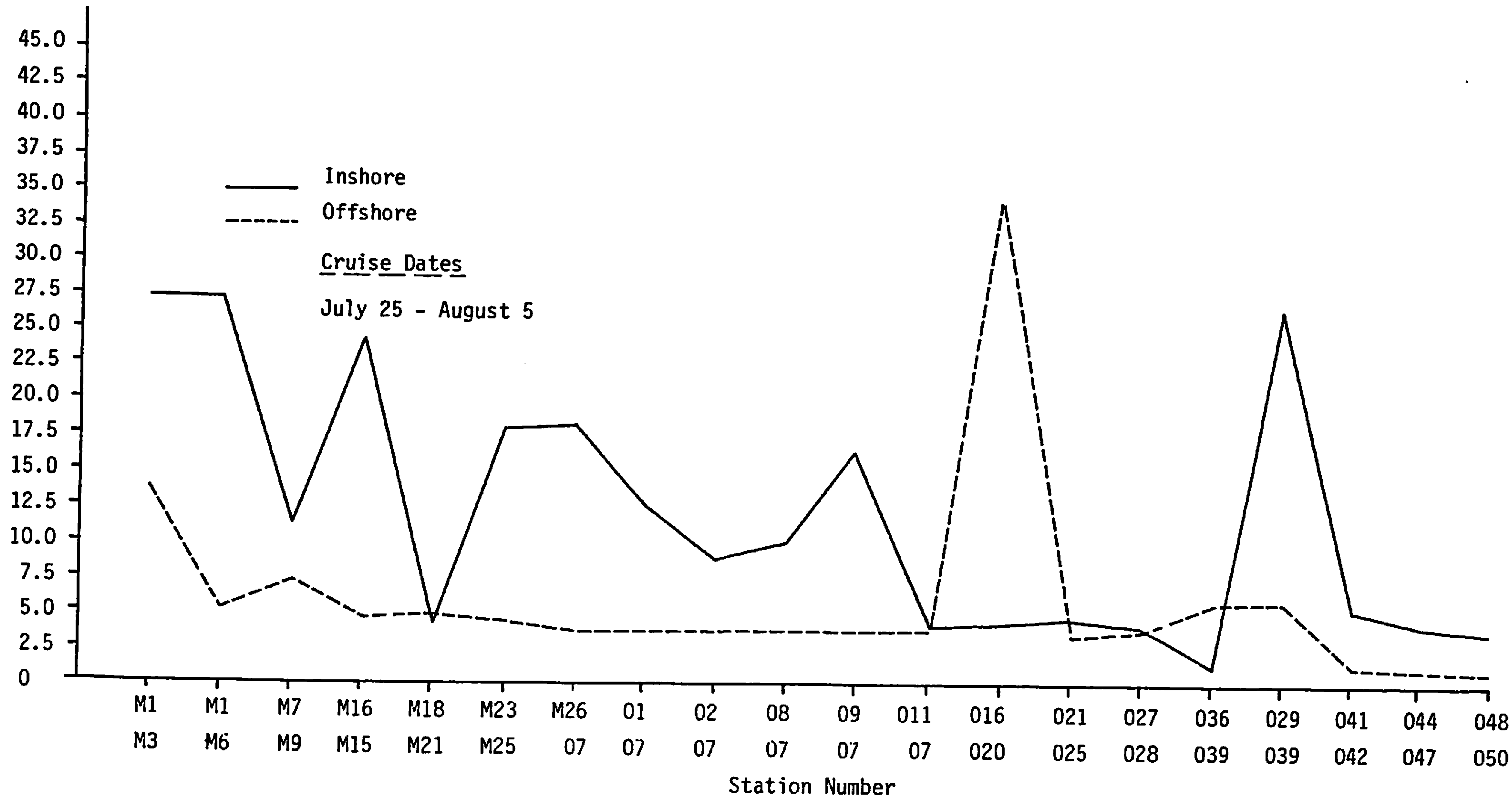


Figure 45. Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 2 of 1979.

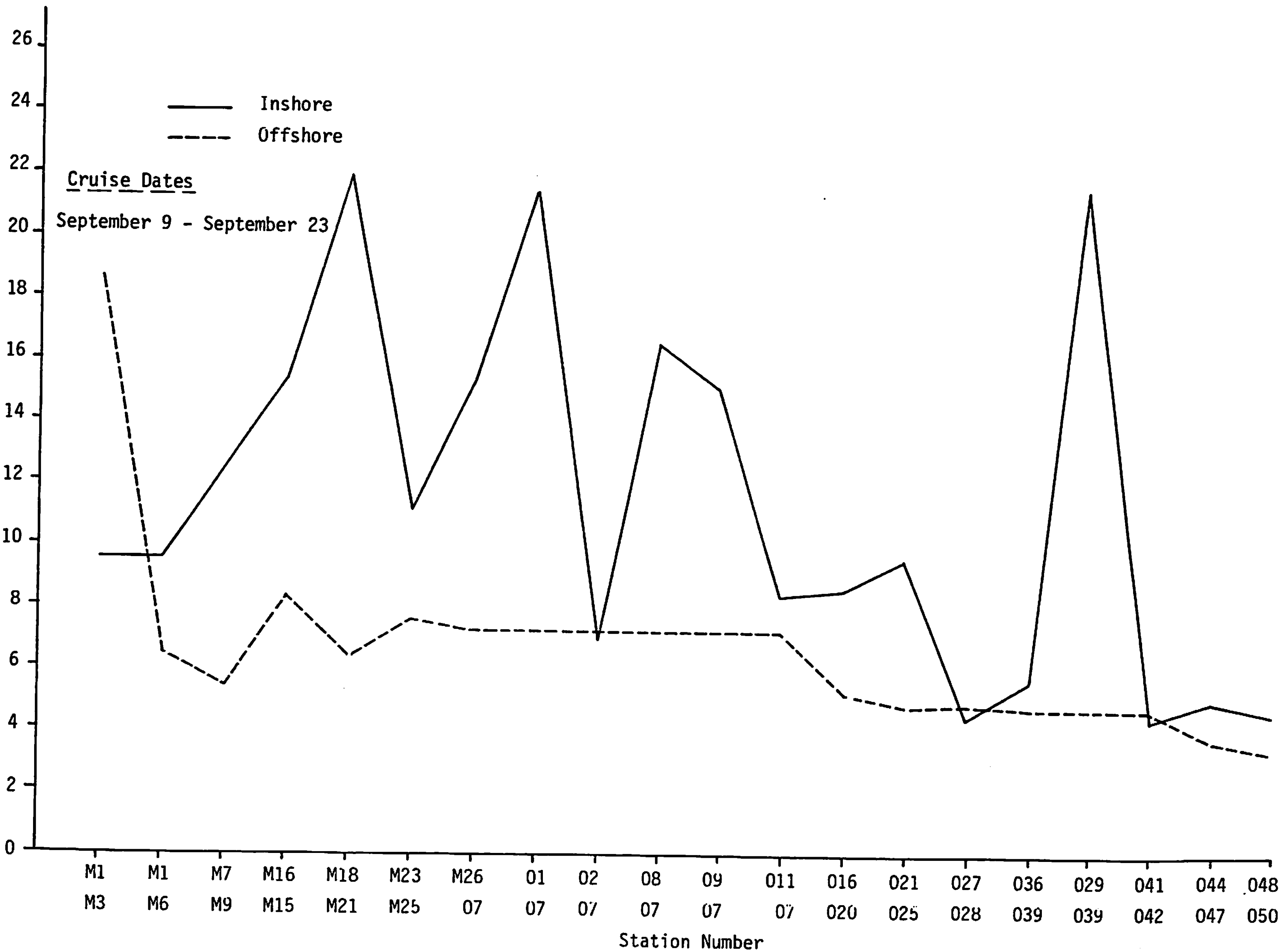


Figure 46. Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 3 of 1979.

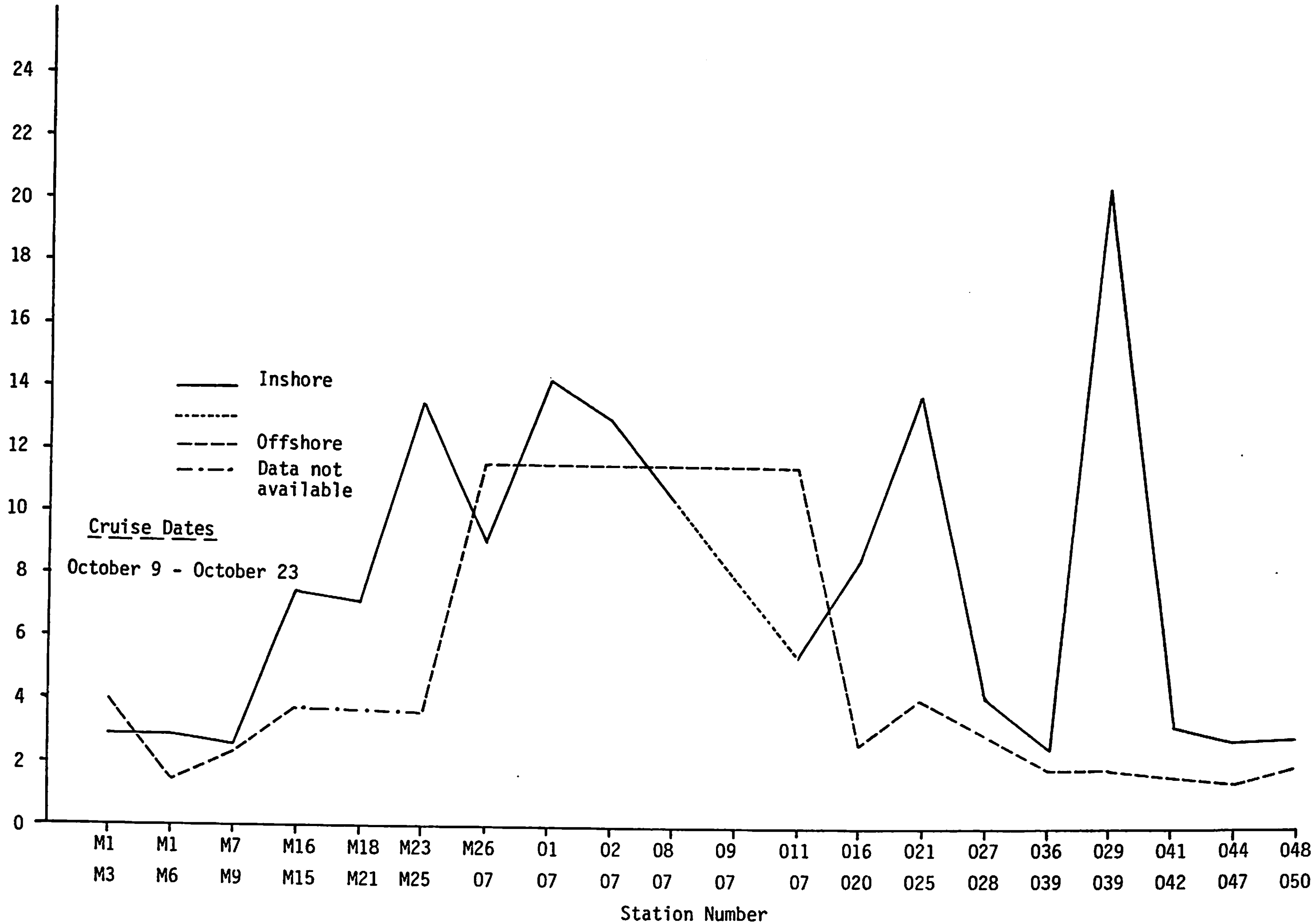


Figure 47. Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 4 of 1979.

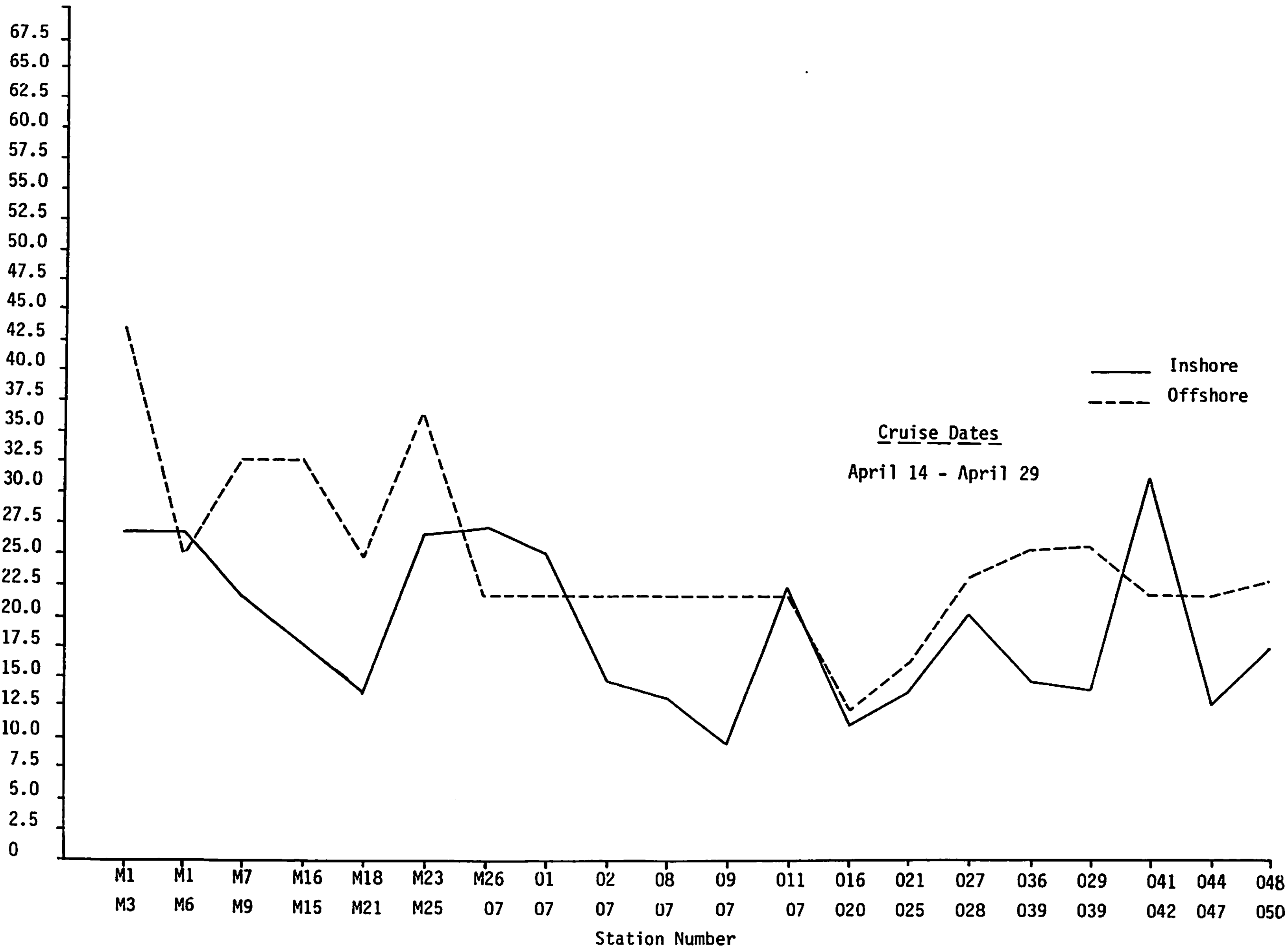


Figure 48. Percent Volatile Suspended Solids at Inshore and Offshore Stations for Cruise 1 of 1978.

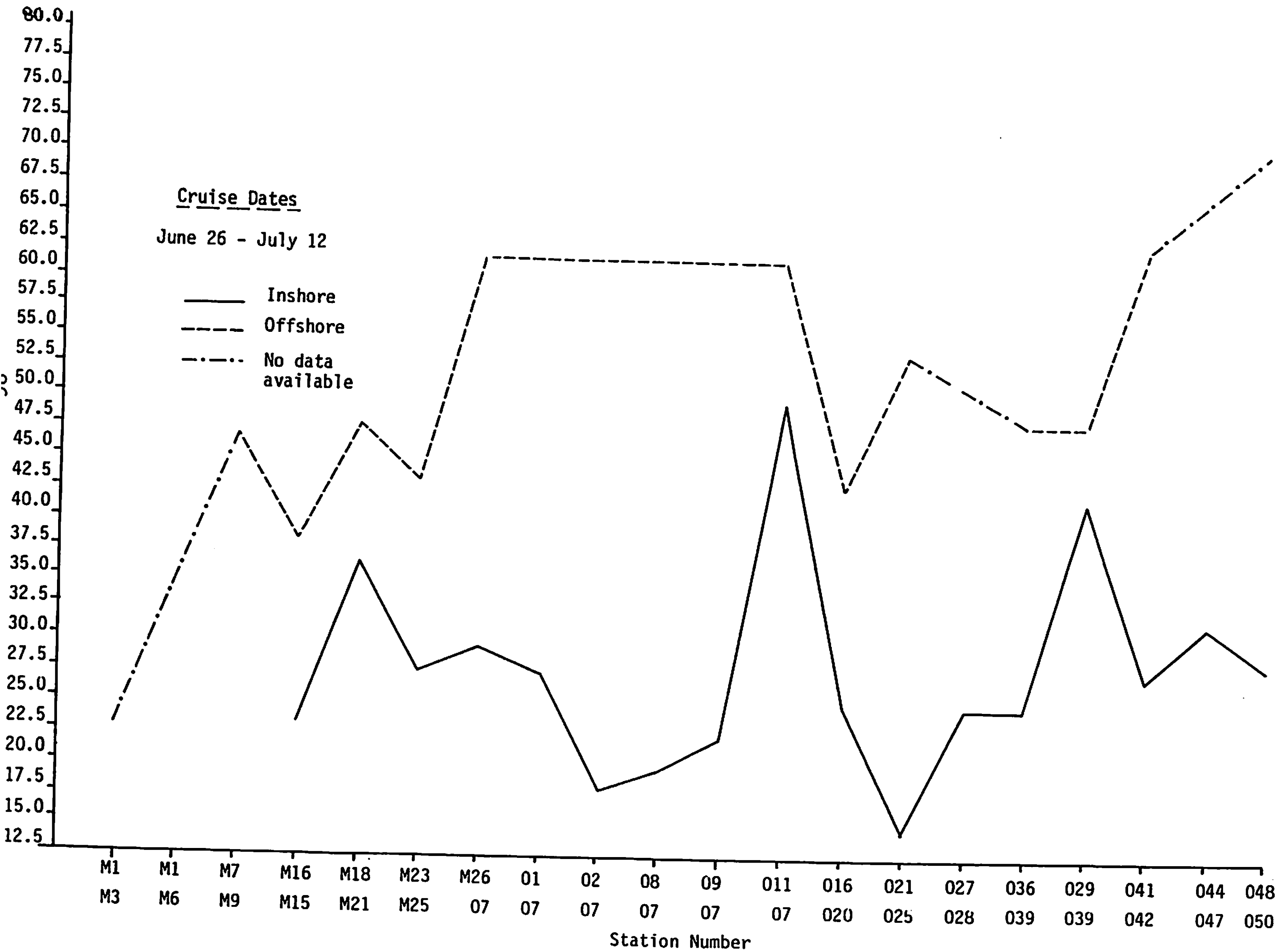


Figure 49 Percent Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 2 of 1978.

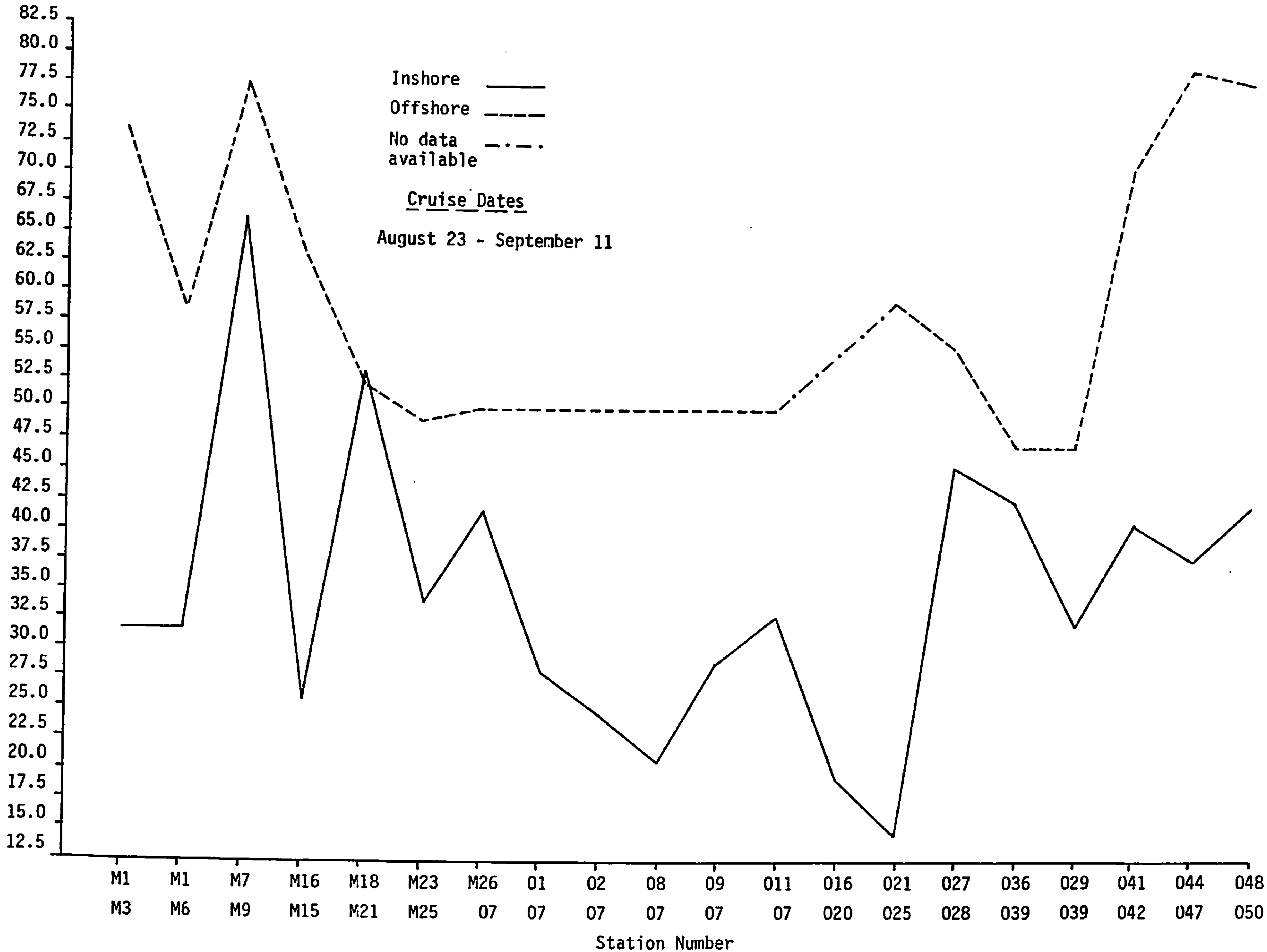


Figure 50. Percent Volatile Suspended Solids at Inshore and Offshore Stations for Cruise 3 of 1978.

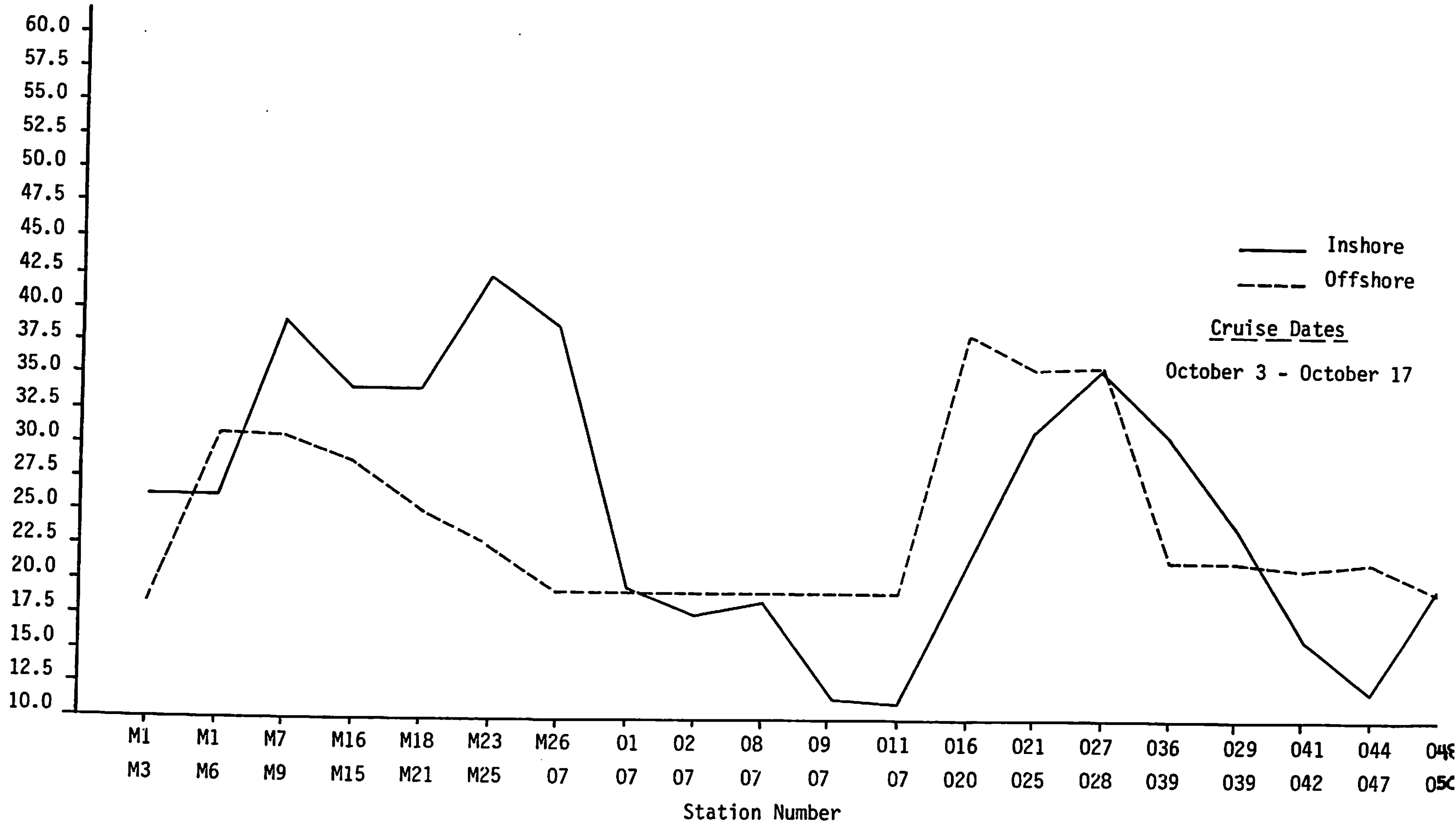


Figure51. Percent Volatile Suspended Solids at Inshore and Offshore Stations for Cruise 4 of 1978.

Figure 52. Percent Volatile Solids, Surface Only at Inshore and Offshore Stations for Cruise 1, 1979.

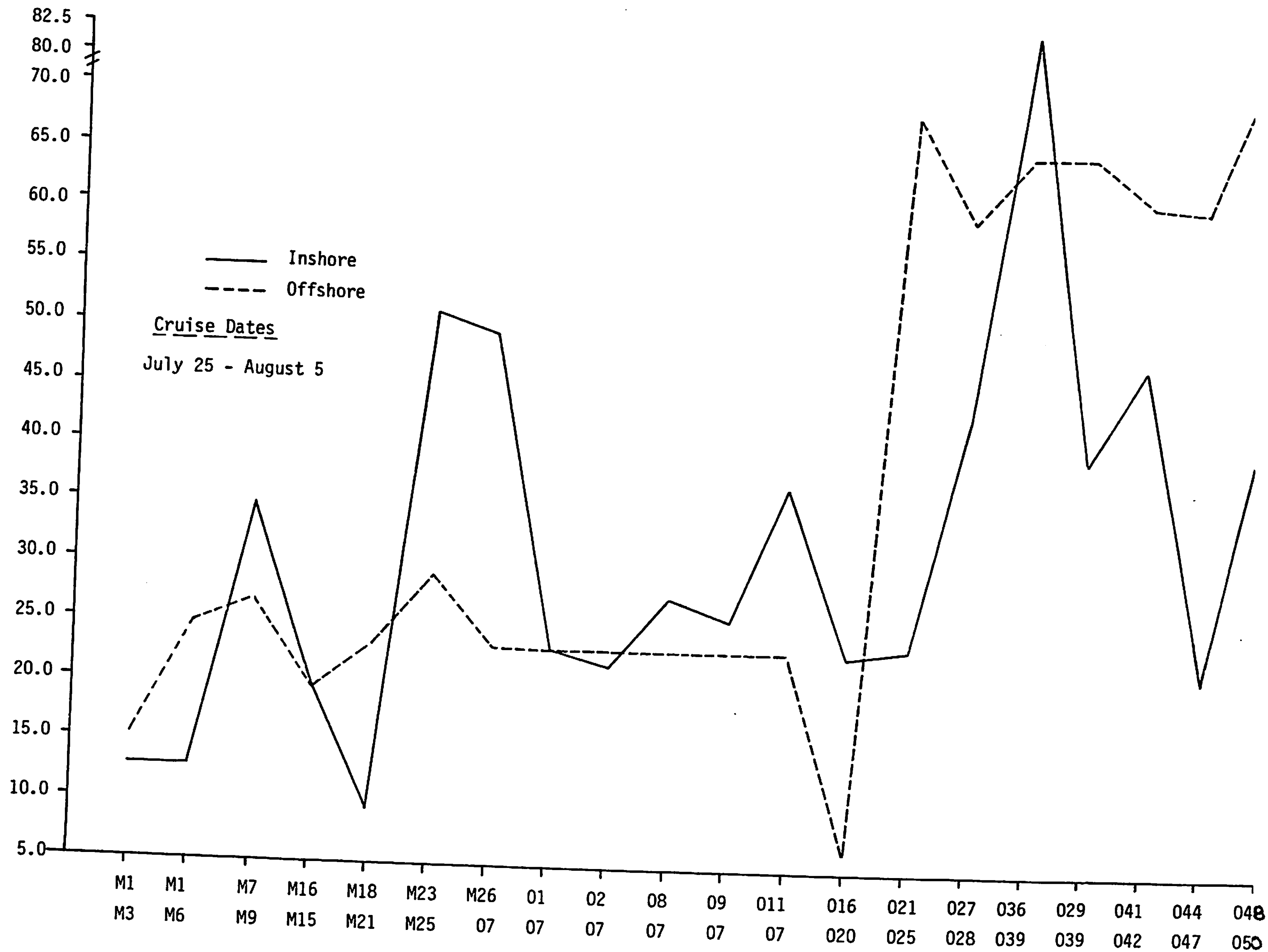


Figure 53. Percent Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 2 of 1979.

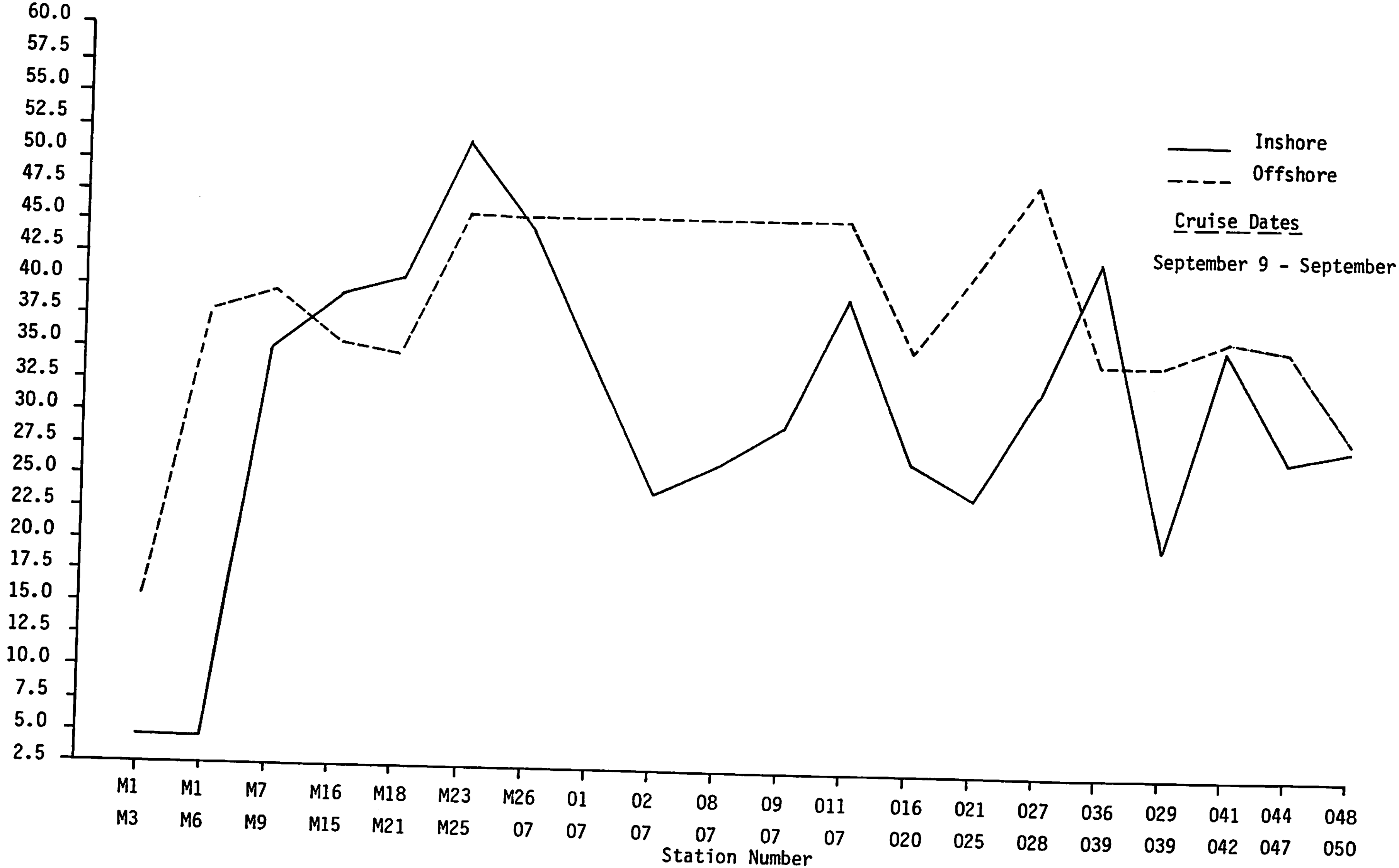


Figure 54. Percent Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 3 of 1979.

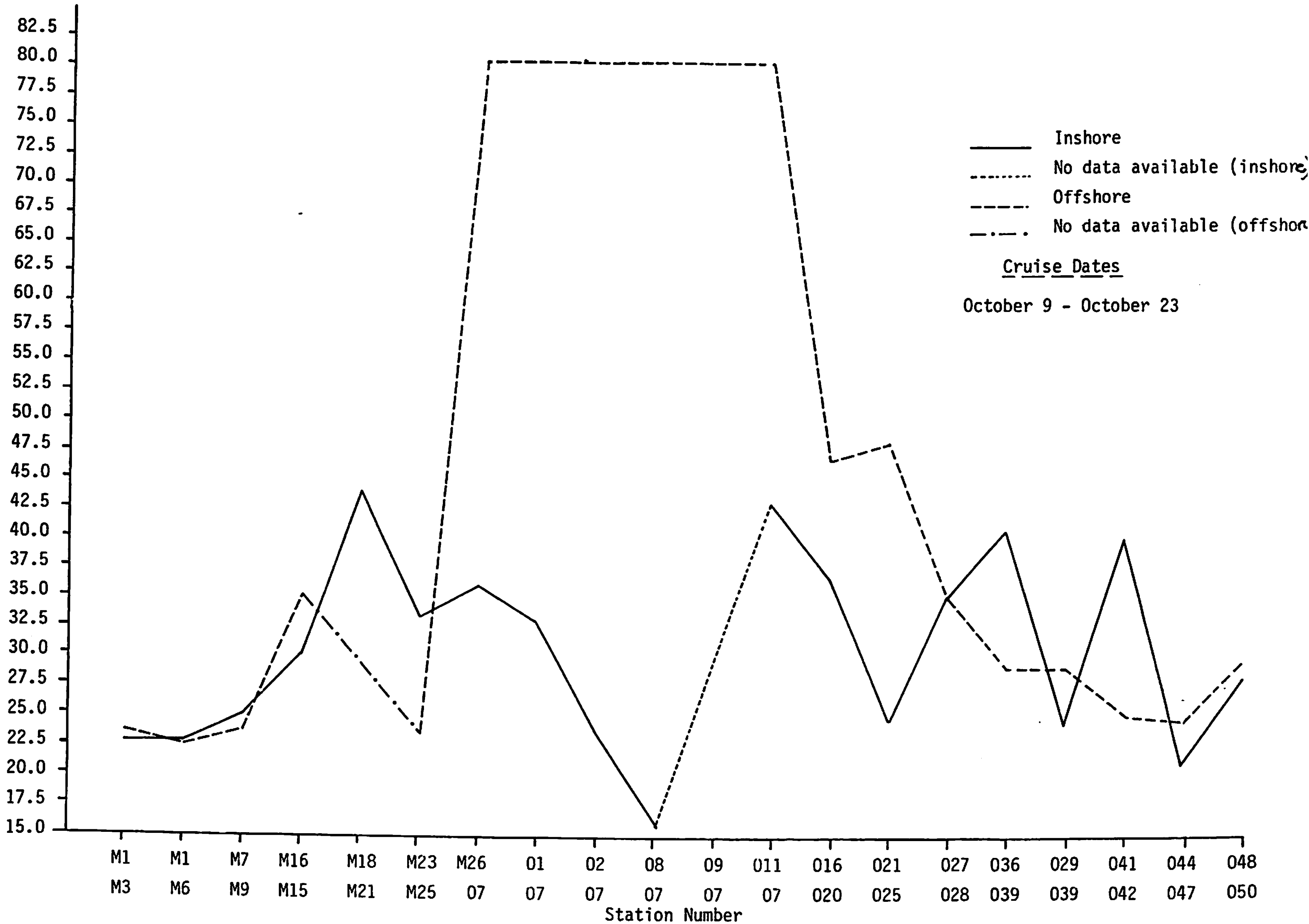


Figure 55. Percent Volatile Suspended Solids, Surface Only at Inshore and Offshore Stations for Cruise 4 of 1979.

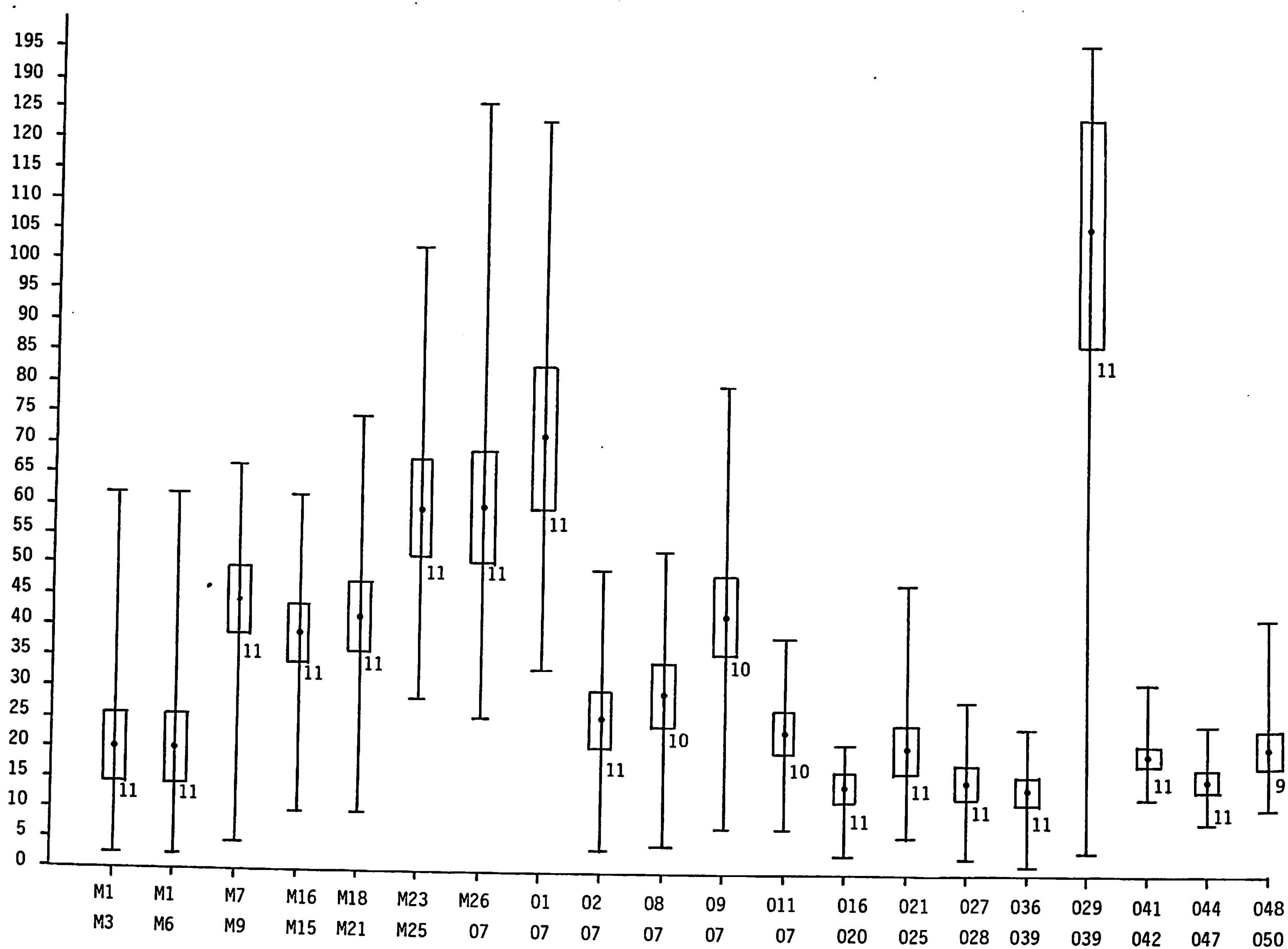


Figure 56 Annual Values Chlorophyll A at Inshore Stations in 1978.

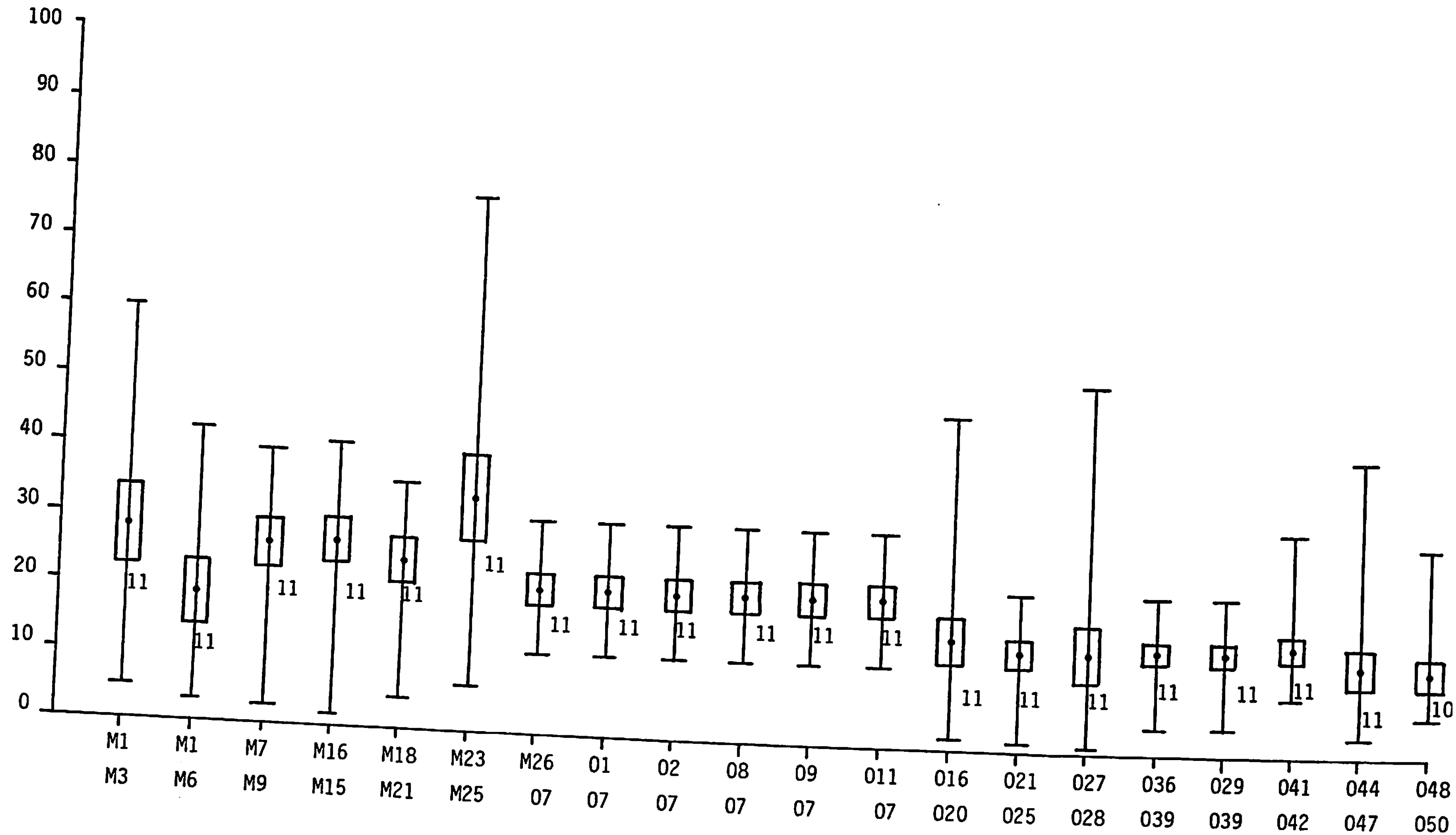


Figure57. Annual Values Chlorophyll A at Offshore Stations in 1978.

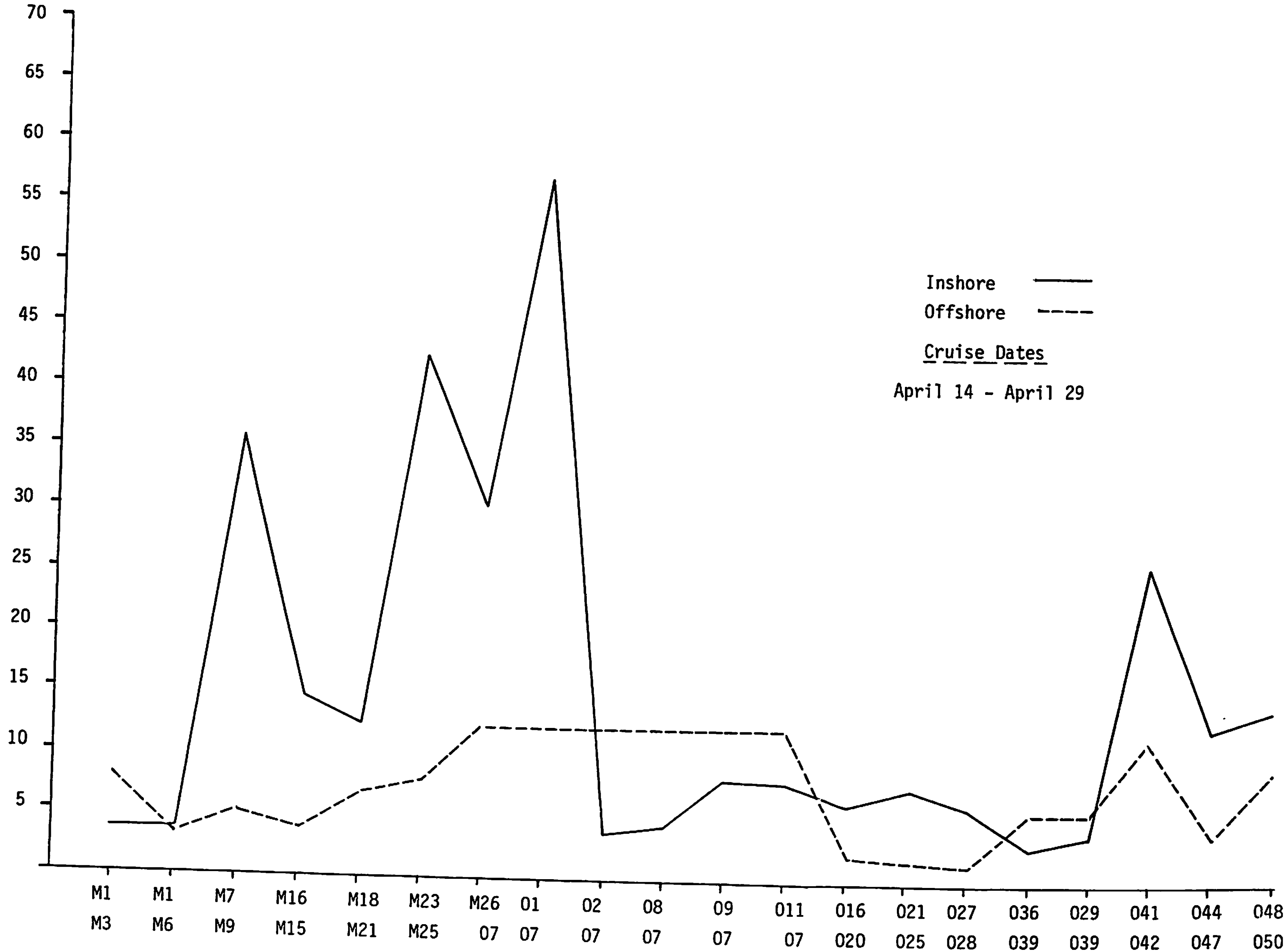


Figure 58. Chlorophyll, Surface at Inshore and Offshore Stations for Cruise 1 of 1978.

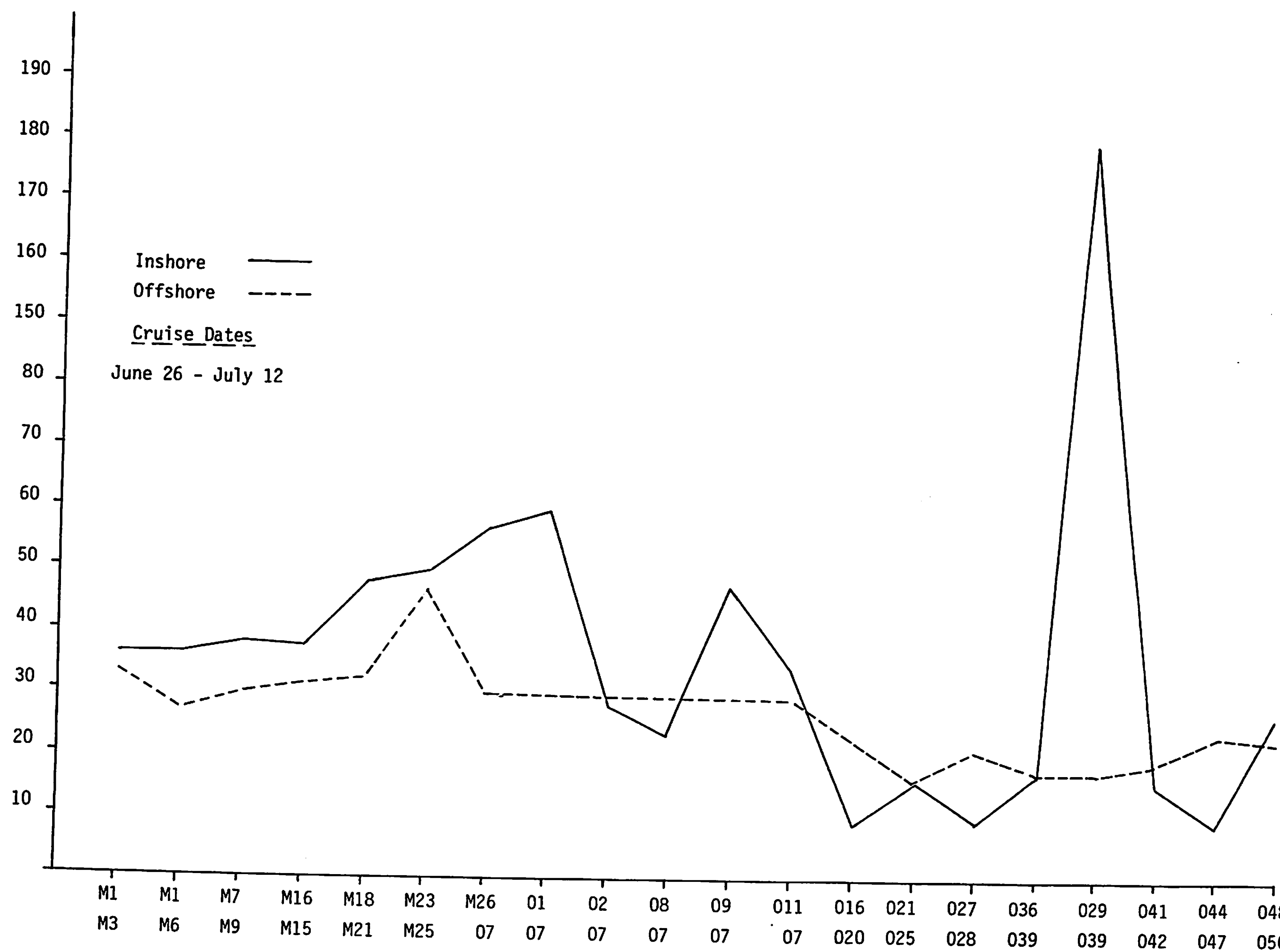


Figure 59. Chlorophyll A, Surface Only at Inshore and Offshore Stations for Cruise 2 of 1978.

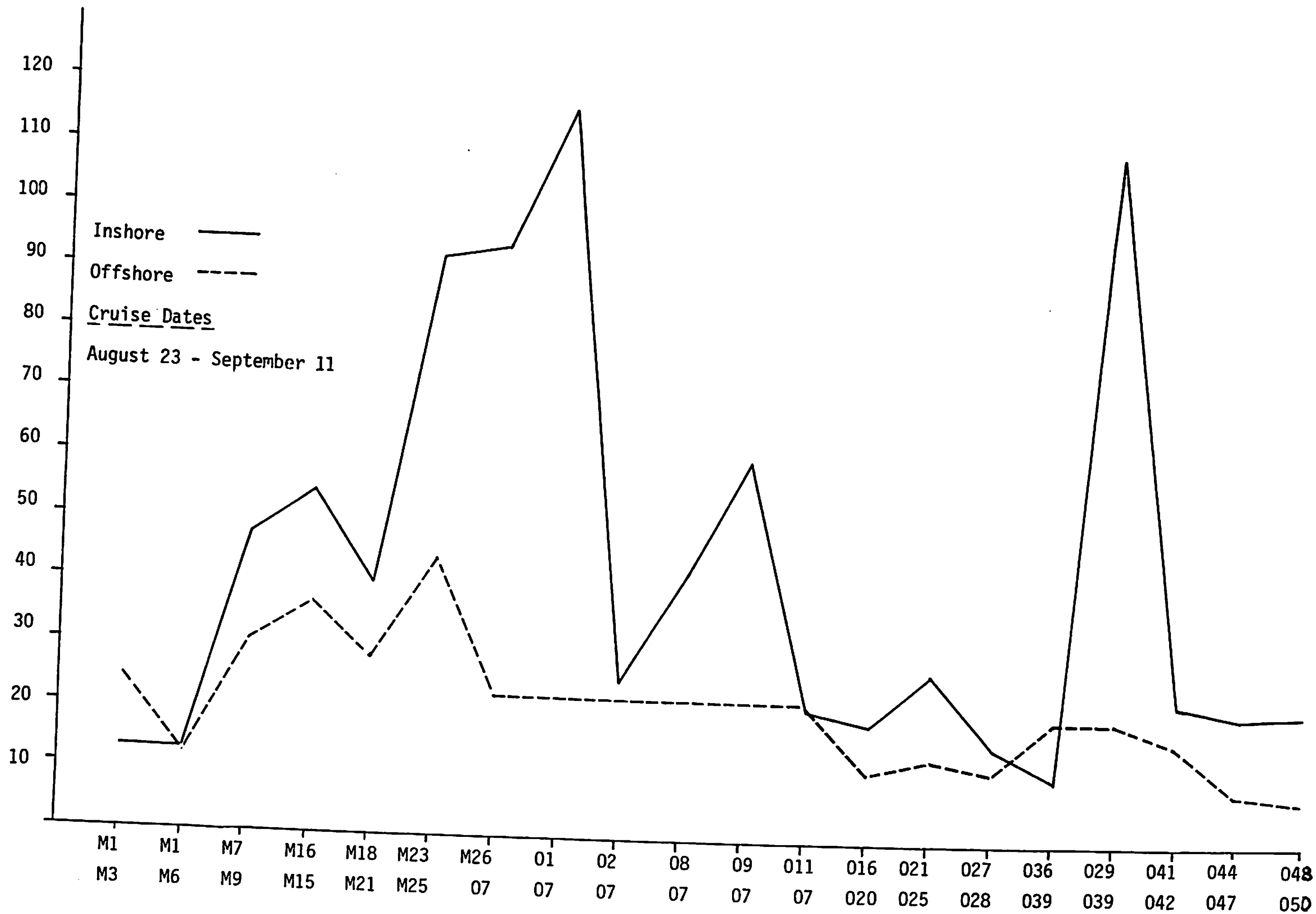


Figure 60. Chlorophyll A at Inshore and Offshore Stations for Cruise 3 of 1978.

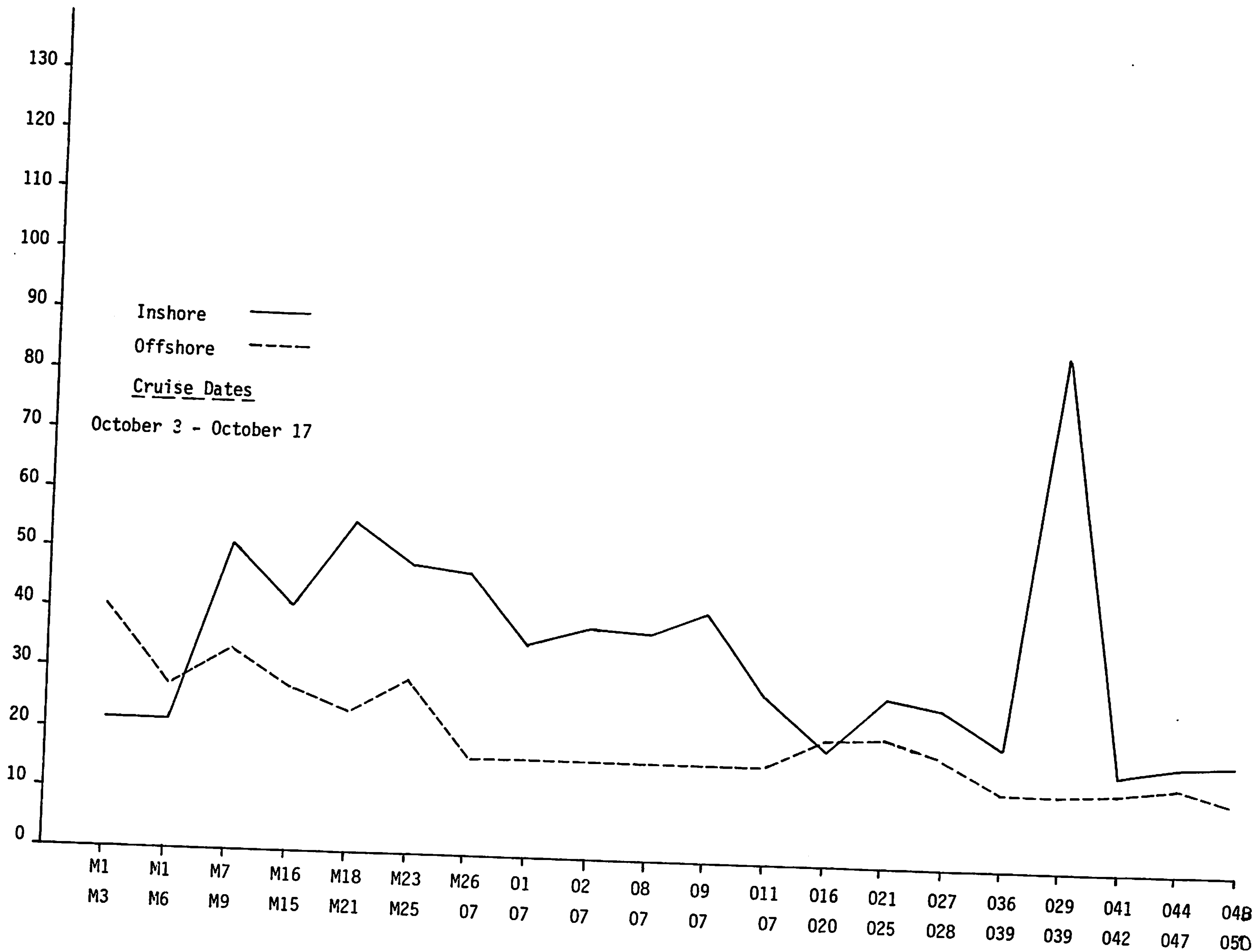


Figure 61. Chlorophyll, Surface Only at Inshore and Offshore Stations for Cruise 4 of 1978.

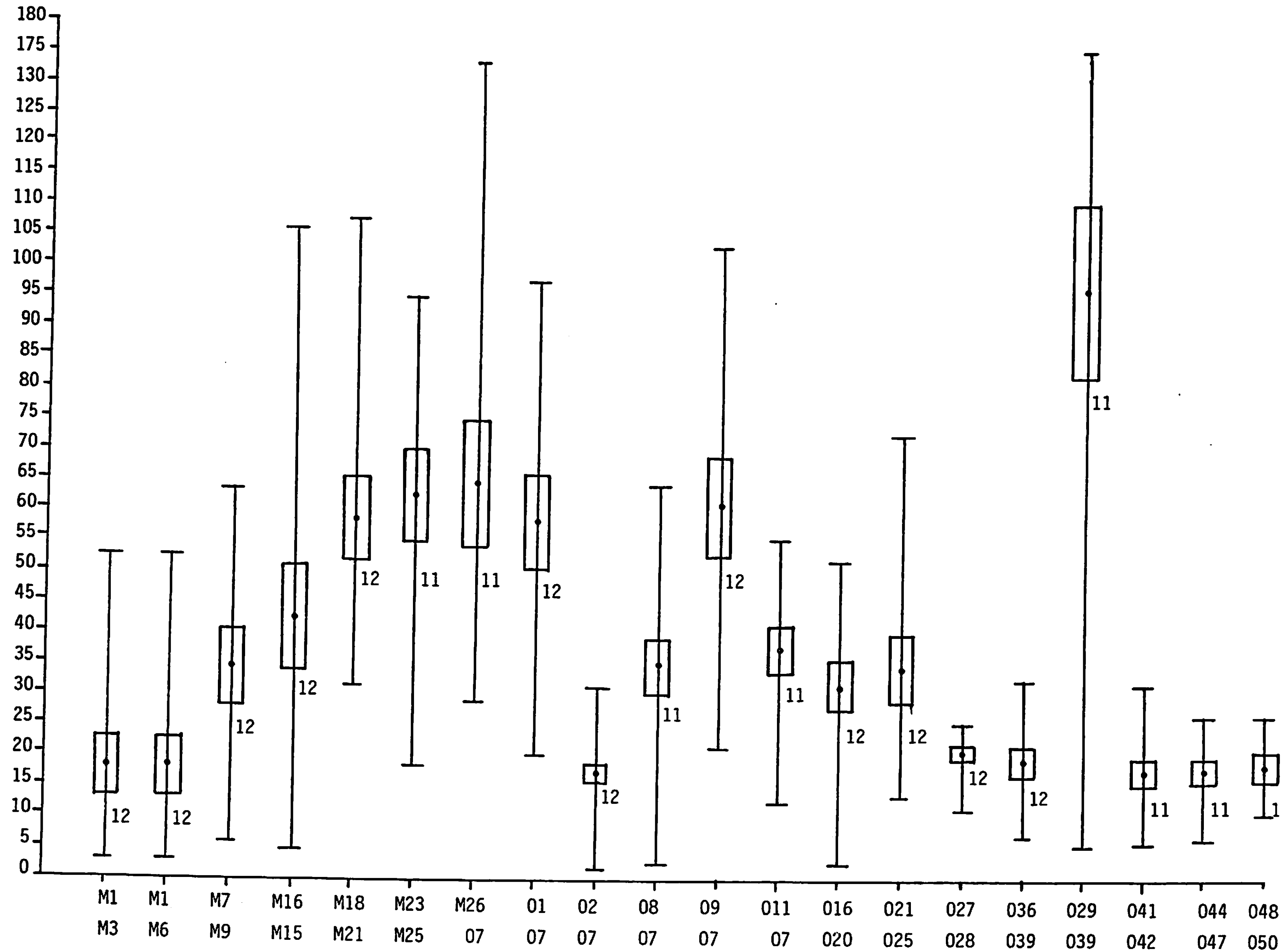


Figure 62. Annual Chlorophyll A at Inshore Stations in 1979.

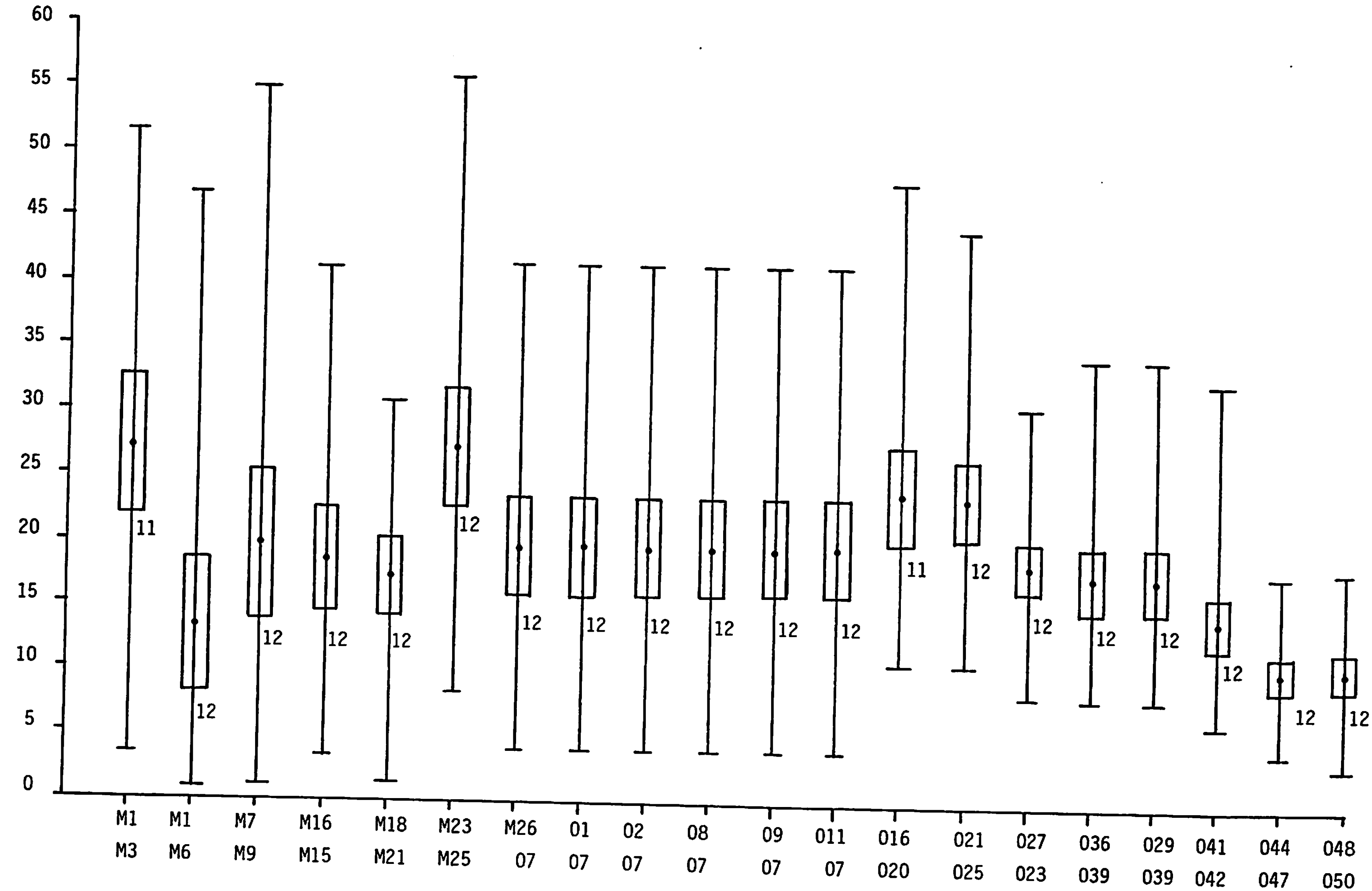


Figure 63.Annual Chlorophyll A at Offshore Stations in 1979.

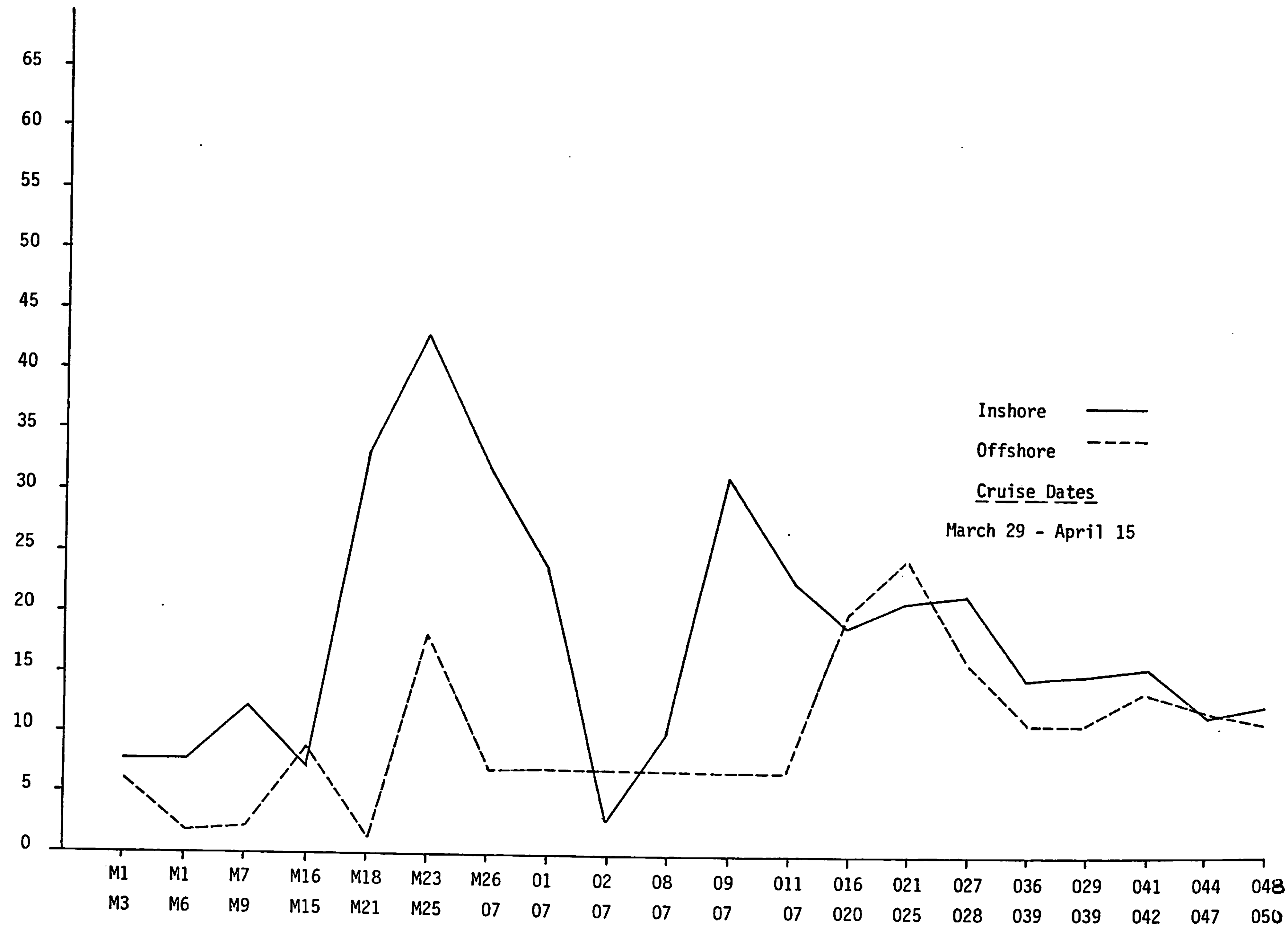


Figure 64. Chlorophyll A at Inshore and Offshore Stations for Cruise 1 of 1979.

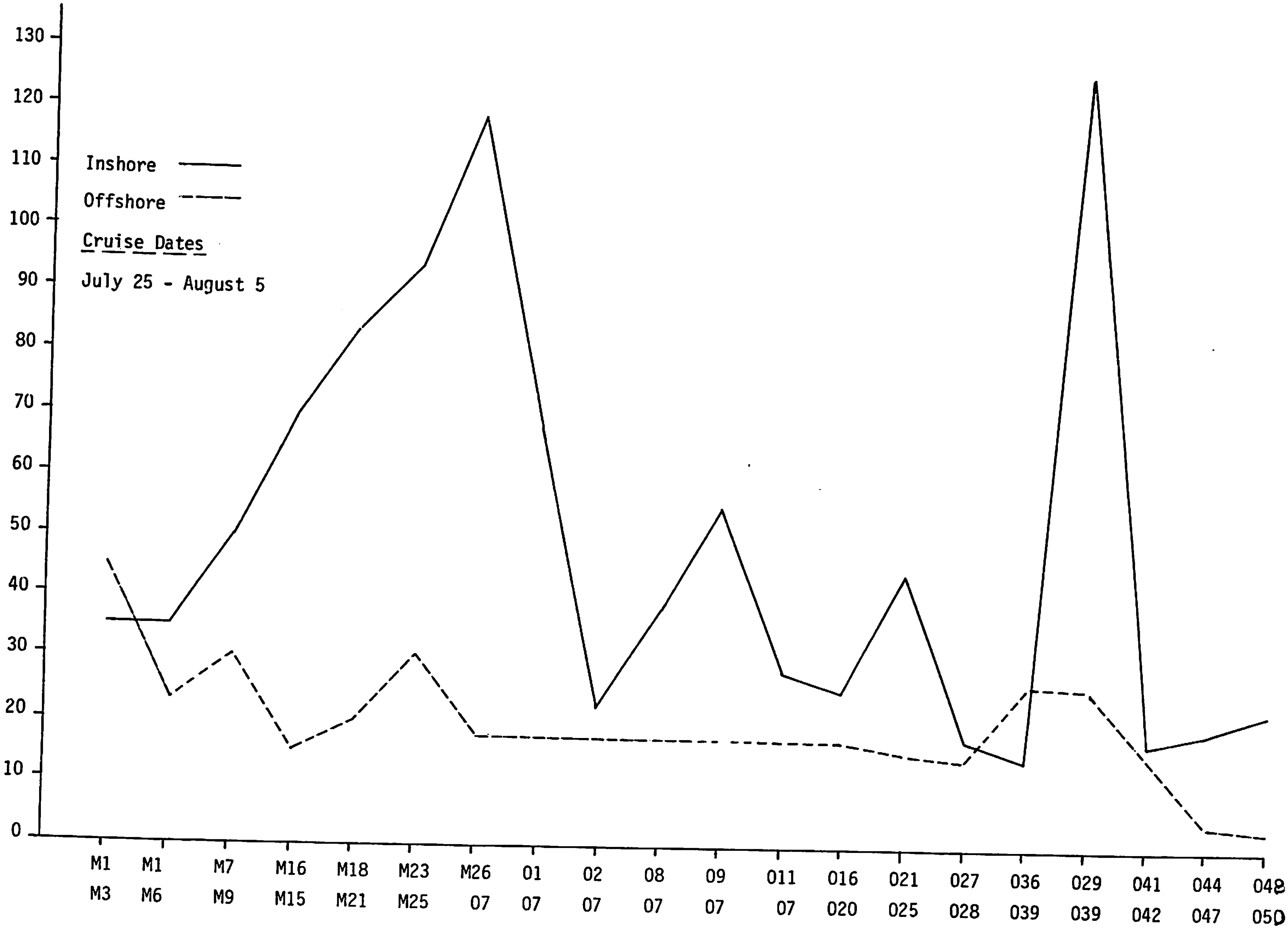


Figure 65. Chlorophyll A at Inshore and Offshore Stations for Cruise 2 of 1979.

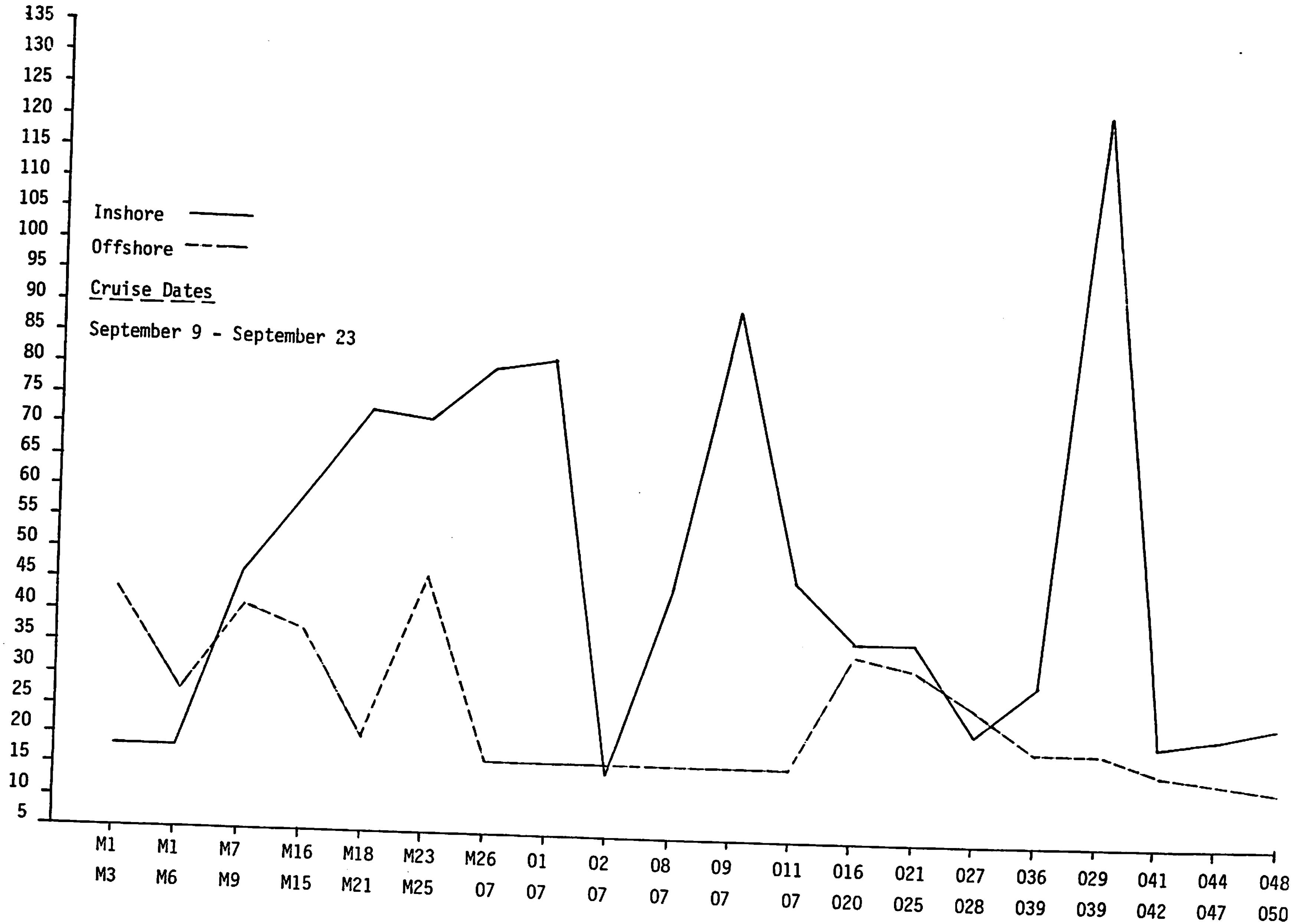


Figure 66. Chlorophyll A at Inshore and Offshore Stations for Cruise 3 of 1979.

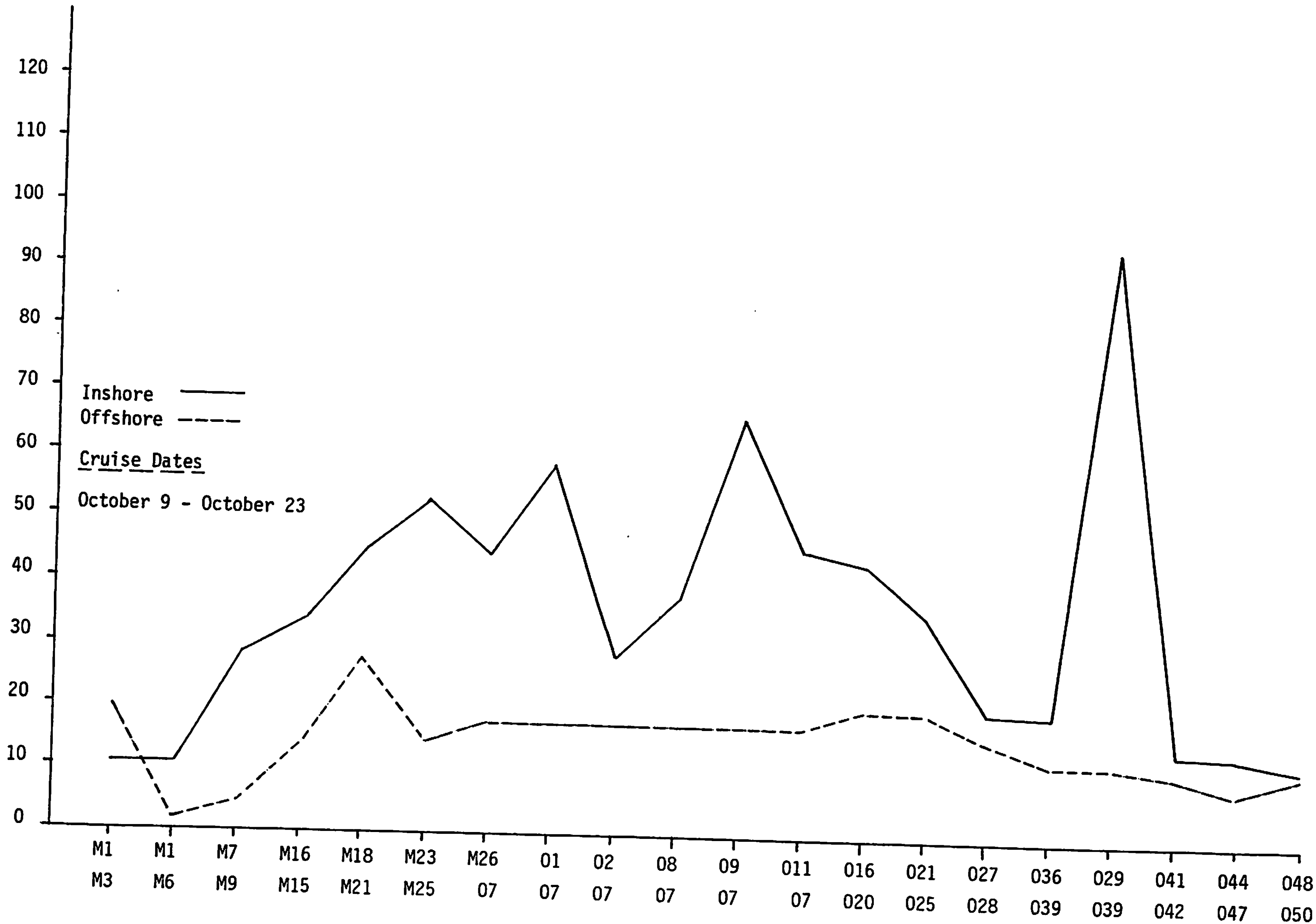


Figure 67. Chlorophyll A at Inshore and Offshore Stations for Cruise 4 of 1979.

FIGURE 68A

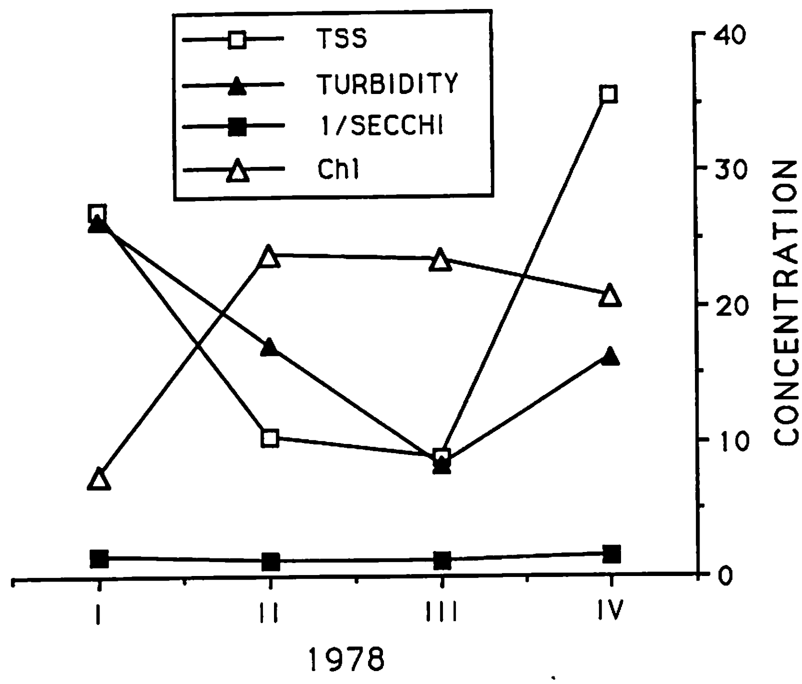
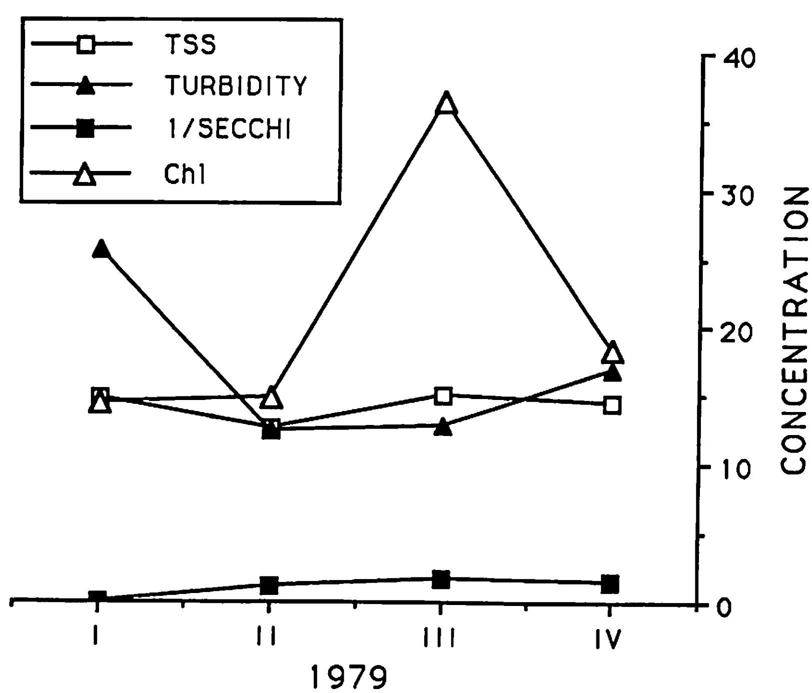


FIGURE 68B



68. Comparison of the Relationship of Total Suspended Solids (mg/1), Turbidity (NTU's), Chlorophyll (ug/1) and the Reciprocal of Secchi Depth (M) for Reach 3 Inshore a) 1978; b) 1979.

FIGURE 69A

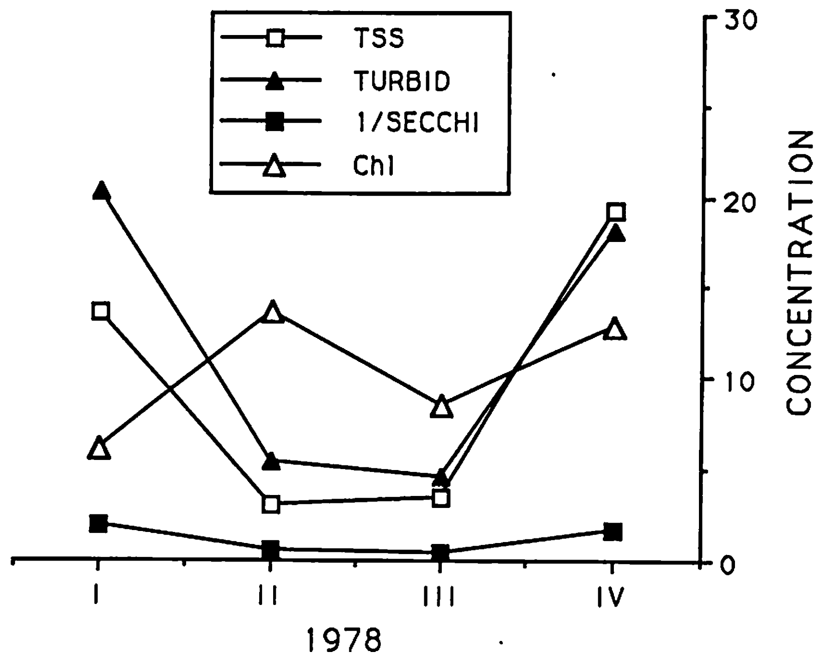
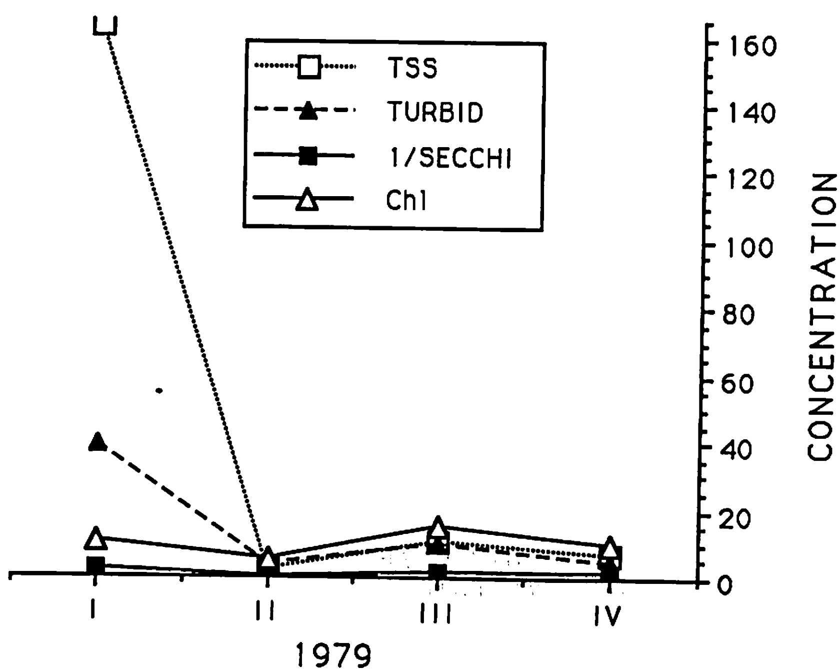


FIGURE 69B



69. Comparison of the Relationship of Total Suspended Solids (mg/1), Turbidity (NTU's), Chlorophyll (ug/1) and the Reciprocal of Secchi Depth (M) for Reach 7 Offshore a) 1978; b) 1979.

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