#### JOB REPORT

E.J. Pullen, Marine Biologist

Project No	o. <u>1</u>	M-2-R-2	·	Date	15 January	1961.		
Project Na	ame: _	Biological	Survey o	of Area M-2.				
Period Co	vered:	: Novembe	er 1959 t	o November	1960.	Jo	b No.	E-2

Hydrographic and Climatological Data for Area M-2

Objectives: To make a hydrographic and climatological study in Area M-2 and determine the effects on marine fauna and flora (Figure I). A chemical and physical analysis was run on water samples collected at stations in the area.

Procedures: Surface water samples were collected by submerging a collecting bottle in water by hand over side of the boat. Subsurface water samples were collected by means of the Nansen reversing water bottle. Surface temperatures were recorded at the time the surface water samples were collected. Bottom temperatures were taken with a reversing thermometer attached to the Nansen bottle at the time the bottom water samples were collected. All the water samples were subjected to chemical and physical tests to determine the conditions that exist in the bay during this time. Turbidity was determined by the Lumetron Colorimeter and the pH was checked with the Beckman pH meter. The dissolved oxygen concentration of the bay water was determined by the Unmodified Winkler Method. All water samples were titrated with silver nitrate to determine the salinity. Data were collected in conjunction with Job No. A-2, B-2, and C-2. Hydrographic and climatological data collected at the Seabrook Field Laboratory were also used in conjunction with this report.

### Findings:

Climatological Data

Climate: Precipitation: The total rainfall, observed at the Seabrook Field Laboratory, for the period of one year of this project was 31.4 inches. This was an average of 2.6 inches per month. A graph of the monthly precipitation record for Area M-2 is presented in Figure II. August 1960 was the month of greatest precipitation with 10.4 inches and April 1960 had less than one inch of rain according to the rain guage at the Seabrook Field Laboratory. Precipitation records per month for the ten principle cities on the Galveston Bay-Trinity Bay watershed are presented in Table 1. This information was taken from the Climatological Data of Texas.

Air Temperatures: This was the important factor in determining the water temperatures in Area M-2; therefore both subjects will be covered in the following discussion. Figure III shows the close correlation between the average air and average water temperatures per month. The air and water temperature show a rise in November and then a slow decline during December, a fairly constant low through January and February, then the temperature starts upward and continues to climb until attaining a peak in July. The temperature begins to decline in August and continues a constant drop through October.

 $\underline{\text{Wind}}$ : Wind speed and direction were the important factors in determining the tides and tubulence in Area M-2. The gravitational pull of the sun and the moon affect the tides very little, but the wind, on the other hand,

change the tide as much as two to three feet in several hours. If the wind blows from a northerly direction, the water level drops due to the water being pushed out of the bays into the Gulf, but when the wind switches to a southerly direction the tides begin to rise rapidly. The wind not only influences the tide levels in the bay, but it also aids in flushing and forcing high salinity water back into the bay. Wind speed and direction were recorded at the Seabrook Field Laboratory twice a day. At the end of each month the average monthly wind speed and prevailing wind direction were determined. This data is presented in Table 2.

# Hydrographic Data

Tides: The normal tide amplitude in Area M-2 was found to be very small, but a "norther" or a strong wind from a southerly direction could cause the tides to vary several feet above or below the normal. As a rule, the tide level was recorded morning and evening at the Seabrook Field Laboratory. All tide level readings were based on the mean sea level and are presented in Table 3 which gives maximum and minimum tides for each month.

Salinity: Upper Galveston and Trinity Bays show two characteristics common to most Texas bays; a horizontal salinity gradient and a vertical salinity gradient in the deep channel in the bay. The horizontal gradient is directly influenced by the rivers, creeks and bayous that constantly pour varying amounts of fresh water into the bay and the vertical salinity gradient is due to the intrusion of the heavy high salinity water moving along the bottom of the ship channel from the Gulf and the lighter fresher bay water flowing over the high salinity water.

By dividing the area into two separate bay systems, Trinity and Upper Galveston Bay, the horizontal salinity gradient is easily followed. Trinity Bay is separated from Upper Galveston Bay by a line from Smith Point to Houston Point. The salinity in this bay is influenced by the Trinity River, Cross Bayou, Double Bayou and Lone Oak Bayou. The Trinity River generally controls the salinity more than the three bayous in the area. Only in December, 1959, did Lone Oak and Double Bayou lower the salinity in the bay more than the Trinity River. The salinity, Table 4, shows that Cross Bayou has the least effect on the salinity conditions in Area M-2. The salinities in this bay were generally low at the mouth of the Trinity River and increase as you move southeast toward Red Fish Island.

The salinity pattern in Upper Galveston Bay is influenced by the Houston Ship Channel, Cedar Bayou and Clear Creek. This bay generally shows a horizontal salinity gradient as you move from Morgan Point southeast toward Red Fish Island. Table 4 shows the salinity patterns in both bays for each month of this project.

The vertical salinity stratification was observed in the Houston Ship Channel all months of this study. Frequently the bottom salinity would more than double the surface salinity. This was due to the intrusion of the heavy high salinity gulf water along the bottom of the channel and a surface flow of the lighter fresh water out of the area.

Salinity samples were collected every week of the year either at hydrographic or trawl stations in Area M-2. An average surface and bottom salinity per month were calculated for the entire area and graphed in Figure V. The highest average monthly salinity for Area M-2 occurred in June 1960 and the lowest average monthly salinity occurred in January 1960. Check the effects of

precipitation on the salinity by referring to Figure II and Table 1.

Dissolved Oxygen: Tests were run to determine the dissolved oxygen concentration in Area M-2 twice a month. This was done in conjunction with the trawl sampling to check pollution and the plankton blooms that were common occurrences in the area this year. Periods of lowest dissolved oxygen concentration occurred from June to September 1960. This was during a period of high water temperatures that lowers the capacity of the water to dissolve oxygen and also during a flooding of the ship channel into the area bringing water with a high bio-chemical oxygen demand. The area of lowest dissolved oxygen concentration during this study was the Houston Ship Channel and the area adjacent to the channel at Morgan Point. This was also the area of the majority of the fish kills in Area M-2 this year. Figure VI shows the average monthly dissolved oxygen concentration in Area M-2 during this project year.

This was done to determine the effects of the channel water and various plankton blooms in the bay. All water samples were brought to the laboratory at Seabrook for analysis. A deviation would be expected in the pH over this time lapse, but any drastic changes were considered to be abnormal. It was found that during periods of ship channel water in the bay, the pH usually dropped below 7 indicating the foreign material was acidic. If a plankton bloom was in the bay the pH usually jumped to 8 or 9.

Turbidity: Water samples collected for trawl and hydrographic data were checked with the Lumitron Colorimeter to determine the percentage of transmittance of light. Averages per month were calculated and presented in Figure VII. November 1959, May 1960 and September 1960 were periods of clearest water in the bay. Winter months were the most tubid due to the strong north winds that were prevalent at this time. The highly turbid condition of the bay water is the main limitation on marine growth in Area M-2. Wind and siltation from the watershed areas were found to be the main factors causing the highly turbid conditions in the bay.

Sediment: All sedimentation data presented here is taken from the "Report on Galveston Bay" by the Corps of Engineers in 1942.

"The volume of Trinity River sediment entering Galveston Bay in suspension in an average year has been determined at 11,750,000 cubic yards."

"The volume of the San Jacinto River sediment entering Galveston Bay in an average year has been determined at 1,300,000 cubic yards."

"For the remaining tributary area of 1,275 miles square, the amount of sediment entering the bay has been determined on the basis of the San Jacinto River record and in the ratio of the respective areas; the volume of sediment entering the bay from these secondary sources has been determined at 200,000 tons or 420,000 cubic yards."

"The total volume of river sediment carried in suspension into Galveston Bay in an average year is 6,354,800 tons or 13,470,000 cubic yards."

'More than 98% of this amount enters the upper bay and less than 2% enters the lower bay."

# Houston Ship Channel Survey

A station was established at Mk. 122 on the Houston Ship Channel to check the effects of the channel water, with the industrial waste, on the marine life

of the area. This station was sampled bi-monthly and hydrographic data recorded. Hydrographic data pertaining to the ship channel is presented in Figure VIII.

Out of twenty-four trawl collections made on the channel this year, five collections made in April, July and August show the ship channel to be barren. During these particular months the dissolved oxygen concentration was never over 2.3 o/ooo.

Twenty-seven vertebrate species were collected at Mk 122 during the year. This was a total of 210 vertebrate animals or less than 1% of the vertebrates collected in Area M-2.

Only six invertebrate species were collected at Mk 122 this year. From the few invertebrates compared to the number of vertebrates collected, it is evident that the vertebrate animals were better able to adjust themselves to the hydrographic conditions of the ship channel water. Following is a list of the vertebrate and invertebrate animals collected at Mk 122 during this project year.

Vertebrate Galeichthys felis Stellifer lanceolatus Micropogon undulatus Cynoscion arenarius Spheroides nephelus Brevoortia patronus Cyprinidon variegatus Anchoa mitchelli Gobius hastatus Menticirrhus americanus Synodus foetens Symphurus plagiusa Citharichthys spilopterus Galeichthys felis Centropristes philadelphicus Mollienesia latipinna Mugil cephalus Menidia beryllina Dorosoma cepedianum	No. Collected  2 24 100 17 2 9 13 16 5 1 3 4 4 2 1 1 1 1 2	Invertebrate Callinectes sapidus Penaeus setiferus Penaeus aztecus Palaemonetes sp. Mnemiopsis mccradyi Squilla empusa	No. Collected  28 18 1 14 abundant 16
	1		
Dorosoma cepedianum Dorosoma petenensis	2		
Leiostomus xanthurus	1 1		
	±		

## Fish Kills in Area M-2

June to October 1960 were months of mass fish mortalities in Area M-2 this year. The majority of the mortalities occurred in the vicinity of Morgan Point. During all fish kills a trip was made up the ship channel to determine the conditions of the channel at the time.

Hydrographic data pertaining to each kill is presented in the following discussion.

June 19, 1960 - This was the first report of a fish kill in Area M-2 this year. An estimated 8 to 10 tons of <u>Brevoortia patronus</u> were trapped in the Houston Yacht Club Basin and died due to lack of sufficient oxygen. The menhaden moved into the yacht basin, which has restricted circulation, and depleted the oxygen in the water. Instead of swimming out of the basin, the fish merely

swam around until they suffocated.

June 28, 1960 - The second and by far the most destructive fish kill of the year accounted for mortalities of ten species of fish. Flounder, drum and speckled trout were the game fish found in this kill. Dead fish were found at 9 a.m. in the vicinity of Morgan Point and Scott's Reef. From all indications the fish had died several hours before they were found. A chemical analysis was run to determine the cause for the mortalities and the oxygen concentration in the kill area was found to range from 3.5 to 4 o/ooo. A trip was made up the ship channel at this time to determine the condition of the channel. Pictures of this fish kill are shown in Figures IX and X.

August 23, 1960 - This was the third major fish kill occurring in Area M-2 this year. The dead fish were found about 10 a.m. from Morgan Point to Scott Reef. A survey was made of the ship channel above Morgan Point to check on the condition of the ship channel. The dissolved oxygen concentration in the channel water was very low and dead fish were seen floating toward the bay. A chemical analysis of the water collected in the bay within the vicinity of the fish kill showed the dissolved oxygen concentration to be around 2.4 parts per million. The chemical smell of ship channel water was noticed in the fish kill area. Menhaden, mullet, croaker, hardhead catfish, and shad made up the majority of the fish in this kill.

September 23, 1960 - Shad, drum, mullet and croaker were found floating from Morgan Point to Scott Reef. From the condition of the fish, it looked like they died several days before they were found. A routine chemical test was run, and the hydrographic conditions were found to be normal by this time. These fish probably died in the ship channel above Morgan Point and floated into the bay due to the current of the channel.

September 29, 1960 - Speckled trout and drum were found dead near the mouth of Cross bayou. These fish had been dead several days when found. A chemical analysis of the water was run but as expected the hydrographic conditions were normal. The cause for this fish kill remains a mystery.

October 21, 1960 - This was the last major fish kill reported in Area M-2 this year. Sand trout, drum and speckled trout were found dead from Morgan Point to the Trinity River. The majority of the fish found had been dead several days before being reported. A chemical analysis was run at various locations in the bay. At this time the dissolved oxygen concentration was 4.0 parts per million in the vicinity of Morgan Point and the chemical smell common to the Houston Ship Channel was observed in the area of the kill.

Although there were fewer menhaden mortalities this year, the fish kills were more detrimental to the sports species of fish. Most of the kills were probably caused by industrial waste from the Houston Ship Channel.

Effects of Plankton Blooms on the Hydrographic Conditions in Area M-2

This year there were numerous plankton blooms in the bay, but three blooms occurring in November 1959, January 1960 and September 1960 caused much speculation among the sport and commercial fishermen. These blooms were not the "red tide" organism, although they could be detrimental to the marine life if they lower the oxygen concentration of the water to a lethal point or if their toxic waste products become too concentrated. No evidence was found to indicate that the blooms were the cause of the fish kill in the bay this year.

To better understand the effects of the "blooms" studies were made from the

bulkhead at the Seabrook Field Laboratory over a twenty-four hour period for the three major blooms of the year. The data collected is presented in Tables 5 through 7.

Conclusion: The author feels that the above discussion is not thorough enough to give a picture of the overall hydrographic conditions month by month. Therefore, Table 8 gives the maximum, minimum and average for the hydrographic data collected in Area M-2 this project year.

Prepared by E.J. Pullen

Accepted by Award T. Lee

Marine Biologist

Date

Accepted by Award T. Lee

### References

Report on Galveston Bay, Texas for the Reduction of Maintenance Dredging. Vol. 1, May 15, 1942. U.S. Engineer Office, Galveston, Texas.

- Chambers, Gilbert V. and Albert K. Sparks, 1959. An Ecological Survey of the Houston Ship Channel and Adjacent Bays. Publication of the Institute of Marine Science. Vol. 6, 1959.
- Gunter, Gordon, 1959. Pollution Problems of the Gulf Coast. Biological Problems in Water Pollution. Transactions of the 1959 Seminar. Tech. Report, W60-3. U.S. Dept. of Health, Education and Welfare. Public Health Service.
- Hohn, Mathew H., 1959. The Use of Diatom Population as a Measure of Water Quality in Selected Areas of Galveston and Chocolate Bay, Texas. Publication of the Institute of Marine Science. Vol. 6, 1959.
- Newcombe, Curtis L., William A. Horne, and Boland B. Shepard. 1939. Studies on the physics and chemistry of estuarine waters in Chesapeake Bay. Sears Foundation. Journal of Marine Research. Vol. II, Nov. 15, 1939.
- Remfro, W.C., 1959. Hydrographic and Climatological Data for Area M-2. Texas Game and Fish Commission, Marine Laboratory. Job Report.
- Renfro, W.C., 1959. Chemical and Physical Analysis of the Water of Area M-2. Texas Game and Fish Commission, Marine Laboratory. Job Report.

Table 1

Precipitation Records of Cities on the Galveston Bay - Trinity Bay Watershed

City	County	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Bowie	Motague	.42	3.49	3.35	2.09	2.29	1.90	3.22	2.13	4.28	1.49	2.24
Gainsville	Cook	.73	3.02	3.63	1.29	1.89	1.27	2.89	1.82	4.22	3.15	3.09
Waxahachie	Ellis	99.	5.74	3.81	2.30	1.28	1.87	2.82	3.56	.82	5.92	1.82
Corsicana	Navarro	1.37	3.60	4.36	2.17	.77	1.69	2.69	06.9	7.	3.77	1.06
Palastine	Anderson	3.68	5.00	5.10	4.02	2.30	3.45	1.52	9.10	. 29	2.63	3.91
Grockett	Houston	3.86	3.72	3.98	4.56	1.68	3.19	88.	8.20	2.37	6.61	1.99
Huntsville	Walker	2.67	67.4	3.52	4.61	1.19	3.26	1.17	10.75	3.67	5.52	4.80
Conroe	Montgomery	2.14	4.56	4.42	4.86	.74	5.57	. 48	11.88	7.73	8.90	1.16
Houston	Harris	1.90	5.34	2.05	3.93	.38	1.42	06.	14.66	5.84	2.78	1.86

Table 2

Prevailing Wind Direction and Speed (mph)

	Nov.	Dec.	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept. Oct.	0ct.
Area M-2	N-10	E-10	N-13	E-12	E-14	SE-10	SE-12	S-10	S-8	S 1 8	N-6	N-8

Table 3

Maximum and Minimum Tides

Area M-2

Month		Maximum Tide	Minimum Tide
November	1959	2.8	-0.4
December	1959	2.0	-0.6
January	1960	1.9	-1.1
February	1960	2.3	-0.1
March	1960	2.5	-0.3
April	1960	2.9	0.1
May	1960	2.5	0.4
June	1960	3.0	0.7
July	1960	2.1	0.8
August	1960	2.5	1.0
September	1960	2.6	1.2
October	1960	2.4	-0.2

Table 4

Average Surface and Bottom Salinities in Trinity Bay (parts per thousand)

0+0+0		Nov	Jen	Tan	Hob Tob	7	Anr	Mav	anti.	July	Α11σ	S. Tu e.S.	Oct
Surf.	ļ				וונ	• 1	• 1 1 1	11.00	13.00	2.00	5.00	4.00	8.50
Bot. Surf.		!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	1			] [	1 	11.00	12.00	1.50	3.50	3.00	5.00
Bot.		10.20	12.70	2.86	8.00	8,84	11.04	14.03	13.47	1.87	4.29	4.92	9,60
Surf. Bot.		12.60	8.90 13.20	5.02 4.80 8.40	1.20	6.68 15.10		o. 4. o. 1.	9 6		10.70	v. 4. V.	9.10
Surf. Bot.		14.90	15,20 15,20	9.00	11.50 11.50	77.77	14.02 14.02	12.23	9.72	5.85 5.85	9.33	11.95	13.77
Surf. Bot.	_	13,70 19.80	15.50	11.90	12.80 24.10	8.67	14.83	12.12	16.64	7.53	12.06	13.73	16.62
Surf. Bot.		12.30	13.90	9.80	11.50	9.79	12.72	14.33	9.9 8.9.9	6.17	10.95	10.89	12.02
Surf. Bot.	•	12.30	14.50	10.20	12.90	9.42	14.38	14.78	10.99	5.91	13.27	13.37	17.37
Surf. Bot.		10.20	8.20	6.20	1.50	9.28	12.07	12.11	15.23	4.34	7.80	10.18	8.75
Surf.		11.50	13.30	5.20	9.10	7.85	13.27	12.37	15.18 15.43	7.15.	10.94	11.45	16.72 16.72
Surf Bot.		13.70	15.40	10.90	10.58	15.63	17.79	16.38	20.19 27.45	11.60	17.84	16.04 24.01	17.99
Surf. Bot.	•	9.70	13.40	5.70	6.60	8.21 12.75	8. <b>9</b> 2 9.27	13.93	16.88 16.88	8.22	12.91	12.42	16.04 16.09
	- 1												

Table 4 - Continued

Stations	Su	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	Mav	June	Tulky	Δ11.05	4 1 0	
							•			2 4 5	8 8		Oct.
tr Q	Surf. Bot.	11.20	11.20	0.30	1.60	2.90	7.60	7.94	11.11	5.72	8.60	8.82	9.78
DB	Surf. Bot.	3.40	4.80	0.20	0.80	15.63 23.28	2.65	6.39	9.33	2.27	5.04	9.97	11.71
AC	Surf. Bot.	3.90	6.90	0.20	0.40	8.21 12.75	1.77	3.78 3.94	7.65	1.37	3.57	5.68	9.17

Table 5

Diurnal Oxygen Curve Laboratory Bulkhead - November 1959 during Gymnodinium and Exuviella bloom

Date	Time	Water Temperature C <sup>o</sup>	ЪН	DO	Turb.	Air Temperature ${\tt C}^{ extsf{O}}$
20 November	1200	13.4		ထ်	86	IJ
	1300	14.3	۰	φ.	69	ГU
	1400	14.2		o,	37	. 4
	1500	14.1	•	ω.	77	4
	1600	14.0	0.6	18.0	65	14.5
	1700	15,9		,	72	. 4
	1800	13,8	۰	· ^	80	4
	1900	H3,8	۰	ŷ	78	. 4
	2000	13,7	۰	ŝ	16	. 4
	2100	13,7	٠	ณ้	77	N
	2200	13.7	Ð	-	84	8
	2300	13.9		å	89	8
	2400	13,5	٥	~	54	
1959						ì
21 November	0100	13,2	•	•	87	0
	0200	13.2		Ļ	ស្ន	(
	0300	13.0	•		61	·
	0400	12.9	•	ó	63	N
	0200	13.0	•	•	82	N
	0090	13.0	•	တိ	82	ì
	0020	12,8	8,4	10.4	87	10.6
	0800	12,9	_	ô	86	Š
	0060	12,2	•	Ŋ	80	2
	1000	13,7	-	4.	75	S
	1100	14.7	•		83	
	1200	18.0		7	n n	ά

Diurnal Oxygen Curve - Laboratory Bulkhead During Eutreptia and Gymnodinium Bloom

28 January 0800 12.0 13.7 11.9 17.7 9 95 H. Fog 0-5 S	January 0800 12.0 10.7 7.9 95 H.Fog 1960  January 0800 15.8 12.8 8.1 H.Fog 1000 15.8 12.8 8.1 H.Fog 1100 15.8 12.8 8.1 9.7 H.Fog 1100 15.8 12.8 8.2 97 8.7 H.Fog 1100 16.1 14.1 14.0 8.2 97 8.7 H.Fog 1100 15.0 15.6 16.8 16.3 8.5 94 8.6 P.F P.F. P.F. P.F. P.F. P.F. P.F. P.F	Date	Time	Temp. Air	, C <b>o</b> H <sub>2</sub> 0	00	ЪН	Turb.	Sa1,	C <b>lo</b> ud	Wind
Jamuary 0800 12.0 10.7 7.9 9.9 H. Fog 0-5 8.1 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Jamuery 0860 12.0 10.7 7.9 9.5 H. Fog 1000 13.8 11.9 8.1 H. Fog 1100 13.8 12.8 8.1 97 H. Fog 1100 14.1 14.0 8.2 97 8.7 H. Fog 1100 14.1 14.0 8.2 97 8.7 H. Fog 1100 15.6 16.8 16.8 8.5 94 8.6 Fog Intitlig 1200 15.6 16.8 16.8 8.6 92 8.6 Sun Spotty 1200 15.0 16.9 14.2 8.6 92 8.6 Sun Spotty 1200 10.0 16.9 14.2 8.6 94 8.5 Sun Spotty 1200 10.0 16.9 14.2 8.6 94 8.3 Sun Spotty 1200 10.0 16.4 11.5 8.5 94 8.3 Sun Spotty 1200 10.0 16.4 11.9 8.3 95 8.6 100% Cloud 1900 10.0 16.4 11.9 8.3 95 8.7 TRAIN 1900 10.0 11.0 14.8 11.5 8.3 95 8.0 Clear 1900 10.0 11.0 14.8 11.5 8.3 95 8.0 Clear 1900 10.0 13.7 12.2 8.4 98 8.0 Clear 1900 6.0 13.7 12.2 8.4 98 8.9 Clear 1900 6.0 13.7 12.2 8.4 98 8.9 Clear 1900 8.0 12.3 11.7 8.4 98 8.9 Pt. Cloudy 1900 8.0 12.3 11.7 8.5 97 8.4 98 8.9 Clear 1000 8.0 12.3 11.7 8.5 8.4 98 8.9 Sun Spotty 1100 8.5 12.5 12.5 8.5 97 8.5 Sun Stoudy 1100 12.5 12.5 8.5 97 8.5 Sun Stoudy 1100 12.5 12.5 8.5 95 8.5 Sun Stoudy 1100 12.5 12.5 8.5 95 8.5 Sun Stoudy 1100 12.5 12.5 8.5 95 8.5 Sun Stoudy 1100 12.5 12.5 8.6 95 8.5 Sun Stoudy 1100 12.5 12.5 8.5 8.5 Sun Stoudy 1100 12.5 12.5 8.5 95 8.5 Sun Stoudy	1960									
9900 13.7 11.9 8.1 H. Fog 15.0 11.9 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0	1000   14.2   11.9   8.1     H. Fog     1000   14.2   15.6   11.9   8.1     H. Fog     1100   14.2   15.6   14.9   8.25   96   8.7   H. Fog     1100   15.6   16.8   16.8   16.3   9.5   96   8.7   H. Fog     1100   15.6   16.8   16.8   15.5   8.6   92   8.6   Fog     1100   15.0   16.8   16.8   15.5   8.6   92   8.6   Fog     1100   16.8   16.8   11.5   8.6   92   8.6   100% Cloud     1100   10.0   16.9   14.2   8.65   94   8.5   8.0     1100   10.0   17.5   11.3   8.4   96   8.5   100% Cloud     1100   18.0   16.4   11.3   8.3   95   7.7   Rain     1200   18.0   16.4   11.9   8.3   97   7.7   Clear     1300   18.0   16.4   11.9   8.3   95   8.0   Clear     1300   18.0   14.2   11.2   8.3   96   8.9   Clear     1300   18.0   13.7   12.2   8.4   98   8.9   Clear     1300   13.0   14.2   11.2   8.4   98   8.9   Clear     1300   13.0   14.2   11.5   8.4   98   8.9   Clear     1300   13.0   13.4   11.5   8.4   98   8.9   Clear     1300   13.0   13.4   11.9   8.4   97   9.5   Pt. Cloudy     1300   13.0   13.0   13.0   13.0   13.0     1300   8.0   12.3   11.7   8.5   97   9.5   Pt. Cloudy     1300   8.0   12.3   11.7   8.5   95   8.5   S1. Cloar     1300   8.0   12.3   12.5   8.5   95   8.5   S1. Cloudy     1300   12.5   12.5   8.5   95   8.5   S1. Cloudy     1300   12.5   12.5   8.6   95   8.5   S1. Cloudy     1300   12.5   12.5   8.6   95   8.5   S1. Cloudy     1300   12.5   12.5   8.6   95   S2.0     1300   13.0   13.0   13.0     1300   13.0   13.5   13.5     1300   13.5   13.5   8.5   95   S2.0     1300   13.5   13.5   8.5   95   S3.0     1300   13.5   13.5   8.5   95   S3.0     1300   1300   13.5   13		0800	G					!!!!	H. Fog	
1000     13.8   12.8   8.1   97     H. Fog     14.1   14.0   8.2   97   8.7   H. Fog     14.1   14.0   8.2   97   8.7   H. Fog     15.0   14.2   14.0   8.2   97   8.7   H. Fog     15.0   14.2   15.0   16.3   8.5   94   8.6   Fog Lifting   5-10   5   15.0   15.0   15.2   8.6   92   8.6   Sun Sportty   5-17   5   15.0   15.0   15.2   15.2   8.6   94   8.5   Sun Sportty   15-17   15.0   15.0   16.9   14.2   8.6   94   8.2   Sun Sportty   15-17   15.0   15.0   15.0   16.9   14.2   8.5   94   8.2   Sun Sportty   15-17   15.0   15	1000 13.8 12.8 8.1 97 H. Fog 1100 14.1 14.0 8.25 97 8.7 H. Fog 1200 14.2 15.0 14.9 8.25 97 8.7 H. Fog 1200 15.6 16.8 16.3 8.5 94 8.6 8.7 H. Fog 15.0 15.0 15.0 16.8 15.5 8.6 92 8.6 8.7 H. Fog 15.0 15.0 15.0 16.8 15.5 8.6 92 8.6 8.7 H. Fog 15.0 15.0 15.0 16.8 15.5 8.6 92 8.6 8.0 10% Cludd 15.0 16.9 16.8 15.5 8.6 92 8.6 8.0 8.0 Spotty 15.0 19.0 16.9 14.2 8.65 94 8.3 8.6 100% Cloud 19.0 17.5 13.3 8.4 96 8.3 10.0 Spotty 15.0 18.0 16.5 14.4 8.3 9.6 8.5 94 8.3 10.0 Spotty 15.0 18.0 16.5 14.4 8.3 9.6 8.5 92 8.0 Spotty 15.0 18.0 16.4 11.1 8.3 9.5 7.7 Rain 2200 18.0 16.4 11.9 8.3 92 8.0 Clear 2200 18.0 16.4 11.9 8.3 92 8.0 Clear 2200 18.0 15.8 11.9 8.3 99 8.0 Clear 2200 18.0 15.4 11.2 8.3 99 96.5 8.3 Clear 2200 18.0 13.7 12.2 8.4 98 8.0 Clear 2200 18.0 13.7 12.2 8.4 98 8.0 Clear 2200 6.0 13.4 11.5 8.4 98 8.4 98 8.0 Clear 2200 6.0 13.4 11.5 8.4 98 8.4 98 8.0 Clear 2200 6.0 13.4 11.2 8.4 98 8.4 98 8.0 Clear 2200 6.0 13.4 11.2 8.5 97 9.6 9.0 Clear 2200 6.0 13.4 11.2 8.5 97 9.6 9.0 Clear 2200 6.0 13.4 11.2 8.5 97 9.6 8.0 Pt. Cloudy 2200 8.0 13.2 11.2 8.5 97 9.6 8.9 Pt. Cloudy 2200 8.0 13.2 11.2 8.5 95 8.5 8.5 8.5 8.5 8.5 8.5 8.5 8.5 8.5 8.		0060	[ ! ! !	Ŋ		•	!	£ [	H. Fog	1
1100     14.1   14.0   8.2   97   8.7   H. Fog     14.1   14.0   8.2   96   8.7   H. Fog     14.1   14.0   8.2   96   8.7   H. Fog     14.1   14.0   8.2   96   8.7   H. Fog     14.1   15.0   15.6   16.8   16.	1100   14.1   14.0   8.2   97   8.7   H. Fog   1300   14.2   15.0   14.9   8.25   96   8.7   H. Fog   14.0   15.0   15.6   16.8   16.5   8.5   96   8.6   Fr. Fog   14.0   15.0   15.6   16.8   15.5   8.6   92   8.6   Sun Spotty   1500   15.6   16.8   15.5   8.6   92   8.6   Sun Spotty   1500   15.8   16.8   14.2   8.6   94   8.5   100% Cloud   15.0   17.5   15.5   8.6   94   8.5   8.6   100% Cloud   15.0   17.5   15.3   8.4   96   8.3   100% Cloud   15.0   17.5   15.3   8.4   96   8.3   100% Cloud   15.0   15.0   15.4   15.3   8.4   96   8.3   100% Cloud   15.0   16.4   15.7   11.1   8.3   95   7.7   Rain   15.0   15.0   15.0   11.9   8.3   97   7.7   Clear   15.0   15.0   11.9   8.3   97   7.7   Clear   15.0   15.0   11.9   8.3   96   8.9   Clear   15.0   14.2   11.2   8.4   98   8.9   Clear   15.0   15.4   11.5   8.4   98   8.9   Clear   15.0   15.4   11.5   8.4   98   8.9   Clear   15.0   15.4   11.5   8.4   98   8.9   Clear   15.0   15.0   15.2   15.2   8.5   97   9.5   Ft. Cloudy   1000   8.0   13.0   11.7   8.4   97   9.5   Ft. Cloudy   1000   8.0   13.0   12.4   8.4   97   9.5   8.7   10.0   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   10.0   10.0   12.5   12.5   8.5   95   8.5   12.0   12.5   12.5   8.5   95   8.5   95   12.5   12.5   12.5   8.5   95   95   8.5   95   10.0   10.0   12.5   12.5   8.5   95   95   95   95   95   10.0   10.0   12.5   12.5   12.5   8.5   95   95   95   95   95   95   95		1000	1 1	W			26	1	H, Fog	ı
1200   14.2   15.0   14.9   8.25   96   8.7   H. Fog   1.5	1200   14,2   15,0   14,9   8,25   96   8,7   H, Feg     1300   15,6   16,8   16,3   8,5   94   8,6   Feg   Feg   Ifftfing     1400   15,6   16,8   15,5   8,6   92   8,6   Feg   Feg   Ifftfing     1500   16,8   16,8   15,5   8,6   92   8,6   Feg   Infftfing     1500   16,8   16,8   14,2   8,6   94   8,2   Sun Sporty     1500   19,0   17,5   15,3   8,4   96   8,2   Sun Sporty     1800   19,0   17,5   15,3   8,4   96   8,2   Sun Sporty     1800   19,0   16,4   11,1   8,3   95   7,7   Rain     2100   18,0   16,4   11,1   8,3   95   7,7   Rain     2200   18,0   16,4   11,1   8,3   95   7,7   Rain     2200   18,0   16,4   11,2   8,3   96,5   8,0     2400   15,0   14,2   11,2   8,4   96   8,0     2400   13,0   14,2   11,2   8,4   96   8,0     2500   26,0   13,4   11,2   8,4   96   8,0     2500   26,0   13,4   11,9   8,4   97   9,5     2500   26,0   13,5   11,9   8,4   97   9,5     2500   26,0   13,5   11,9   8,4   97   9,5     2500   26,0   13,5   11,9   8,4   97   9,5     2500   26,0   13,5   11,9   8,4   97   9,5     2500   26,0   12,9   11,5   8,5   9,5     2500   26,0   13,6   12,7   8,5   9,5     2500   26,0   12,9   11,5   8,5   9,5     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500   26,0   27,0     2500		1100	000 and 000 and	4,		•	26		H. Fog	٠
1500   15.6   16.8   16.3   8.5   94   8.6   8.6   Sun Sporty   5-10   8.6   15.0   15.0   15.0   15.5	1500   15.6   16.8   16.3   8.5   94   8.6   8.6   Sun Sporty   1400   15.0   16.8   16.3   8.6   92   8.6   Sun Sporty   1500   16.8   16.8   16.8   8.6   92   8.6   Sun Sporty   1500   16.8   16.8   16.8   16.8   8.6   94   8.2   Sun Sporty   1500   19.3   16.8   14.2   8.6   94   8.2   Sun Sporty   1800   19.0   17.5   13.3   8.4   95   8.3   100% Cloud   1800   18.0   16.4   13.7   8.3   95   7.7   Rain   1800   18.0   16.4   13.7   8.3   95   7.7   Rain   1800   18.0   16.4   11.1   8.3   95   7.7   Rain   1800   18.0   16.4   11.1   8.3   95   7.7   Rain   1800   18.0   16.4   11.9   8.3   97   7.7   Clear   18.0   16.4   11.9   8.3   97   7.7   Clear   18.0   14.9   12.2   8.3   96.5   8.9   Clear   18.0   14.2   11.2   8.3   96.5   8.3   Clear   18.0   18.0   18.0   18.0   18.0   18.0   Clear   18.0   18.0   18.0   18.0   18.0   Clear   18.0   18.0   18.0   18.0   Clear   18.0   18.		1200	14.2	ιζ		જું	96	•	H. Fog	
1400   15.0   16.7   15.5   8.6   92   8.6   Sun Spotty   5-17   State   1500   15.0   16.8   16.4   16.5   16.4   16.7   11.1   16.3   16.8   16.9   16.0   16.4   11.9   16.3   17.7   16.8	1400 15.0 16.7 15.5 8.6 92 8.6 Sun Spotty 1500 16.8 16.8 15.5 8.6 92 8.6 100% Cloud 1600 20.0 16.8 15.5 8.6 94 8.3 100% Cloud 1600 19.0 16.9 17.5 13.3 8.4 96 8.3 100% Cloud 1800 19.0 17.5 13.3 8.4 96 8.3 100% Cloud 1800 18.0 16.4 13.7 8.3 95 7.7 Rain 2200 18.0 16.4 11.9 8.3 97 7.7 Clear 2200 18.0 16.4 11.9 8.3 97 7.7 Clear 2200 18.0 15.8 11.9 8.3 97 7.7 Clear 2400 13.0 14.8 11.2 8.4 96 8.0 Clear 2400 13.0 14.9 11.2 8.4 98 8.0 Clear 0200 9.0 14.2 11.2 8.4 98 8.0 Clear 0200 9.0 14.2 11.2 8.4 98 8.0 Clear 0200 9.0 14.2 11.2 8.4 98 8.9 Clear 0200 6.0 13.4 11.9 8.4 98 8.9 Clear 0200 6.0 13.4 11.9 8.4 97 9.2 Clear 0200 8.0 13.0 12.2 8.5 97 9.6 Pt. Cloudy 0200 8.0 12.9 11.5 8.5 97 9.5 Pt. Cloudy 0200 8.0 12.0 12.0 8.6 97 8.4 Pt. Cloudy 0200 8.0 12.0 12.0 8.6 97 8.5 S1. Cloudy 0200 8.0 12.0 12.2 8.5 95 8.5 S1. Cloudy 0200 12.5 12.2 8.5 95 8.5 S1. Cloudy 0200 12.5 12.2 8.5 95 8.5 S1. Cloudy 0200 12.5 12.2 8.6 95 8.5 S1. Cloudy 0200 12.5 12.2 8.6 95 8.5 S1. Cloudy		1300	15.6	ŷ			94		Fog Lifting	
1500   16.8   16.8   15.5   8.6   93   8.6   100% Cloud   15   15   15   15   15   15   15   1	1500   16.8   16.8   15.5   8.6   93   8.6   100% Cloud     1500   10.8   16.8   14.2   8.65   94   8.5   8.5   100% Cloud     1700   19.3   16.8   14.3   8.65   94   8.5   Sun Sporty     1800   19.0   17.5   13.3   8.4   96   8.2   Sun Sporty     1800   18.0   16.4   13.7   8.3   95   7.7   Rain     2200   18.0   16.4   11.9   8.3   97   7.7   Clear     2200   18.0   16.4   11.9   8.3   97   7.7   Clear     2200   18.0   16.4   11.9   8.3   97   7.7   Clear     2200   18.0   14.9   12.2   8.3   97   7.6   Clear     2400   15.0   14.9   12.2   8.3   96.5   8.5   Clear     2400   15.0   14.2   11.2   8.4   98   8.0   Clear     2500   6.0   13.7   12.3   8.4   98   8.0   Clear     2500   6.0   13.4   11.9   8.4   97   9.2   Clear     2500   6.0   13.4   11.9   8.4   97   9.5   Clear     2500   6.0   13.4   11.9   8.4   97   9.5   Clear     2500   6.0   13.4   11.9   8.4   97   9.5   Pt. Cloudy     2500   8.0   12.3   11.7   8.5   97   9.5   Pt. Cloudy     2500   8.0   12.3   12.4   8.4   97   8.9   Pt. Cloudy     2500   8.0   12.5   12.5   8.5   95   8.5   S1. Cloudy     2500   12.5   15.2   12.5   8.5   95   8.5   S1. Cloudy     2500   12.5   15.2   12.5   8.5   95   95   8.5     2500   12.5   12.5   8.5   95   95   8.5     2500   12.5   12.5   8.5   95   95   8.5     2500   2500   2500   2500     2500		1400	15.0	ŷ	بُكا		92		Sun Spotty	
1600   20,0   16,9   14,2   8,65   94   8,2   Sun Spotty   15-17   S   1700   19,5   14,2   8,6   94   8,2   Sun Spotty   15-17   S   16,8   14,4   8,3   94   8,2   Sun Spotty   15   S   1800   19,0   16,4   14,4   8,3   95   7,7   Rain   0-5   -5   -5   -5   -5   -5   -5   -	1600   20.0   16.9   14.2   8.65   94   8.5   Sun Spotty     1700   19.5   16.8   14.2   8.6   94   8.2   Sun Spotty     1800   19.0   17.5   12.3   8.6   94   8.2   Sun Spotty     1800   19.0   16.5   14.4   8.3   95   7.7   Rain     2000   18.0   16.7   11.1   8.3   95   7.7   Rain     2100   18.0   16.4   11.9   8.3   97   7.7   Clear     2300   16.0   15.8   11.9   8.3   97   7.7   Clear     2400   13.0   14.9   11.2   8.3   96.5   8.0   Clear     2400   13.0   14.2   11.2   8.4   98   8.0   Clear     2500   8.0   15.7   12.3   8.4   98   8.0   Clear     2500   6.0   13.7   12.3   8.4   98   8.0   Clear     2500   6.0   13.4   11.9   8.4   97   9.5   Clear     2500   6.0   13.4   11.9   8.4   97   9.5   Clear     2500   6.0   13.4   11.9   8.4   97   9.5   Clear     2500   8.0   12.9   11.7   8.5   97   9.5   Pt. Cloudy     2500   8.0   12.9   12.7   8.5   97   9.5   Pt. Cloudy     2500   8.0   13.0   12.4   8.4   97   8.5   97     2500   8.5   13.0   12.4   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   12.5   12.5   8.5   95   8.5     2500   2500     2500   2500   25		1500	16.8	ŷ	Ŋ	•	86	•	100% Cloud	
1700 19,3 16,8 14,3 8.6 94 8.2 Sun Spotty 15 8 1800 19,0 11,5 13,3 8,4 96 8,3 100% Cloud 0-5 - 1800 18,0 16,5 13,3 8,4 96 8,3 100% Cloud 0-5 - 2000 18,0 16,4 13,7 8,3 92 8,0 Rain 5-10 8 2200 18,0 16,4 11,9 8,3 97 7,7 Rain 5-10 N 2200 18,0 16,0 11,9 8,3 97 7,7 Clear 5-10 N 2200 18,0 16,0 11,9 8,3 97 7,7 Clear 10-15 N 2400 13,0 14,9 11,2 8,4 96 8,0 Clear 17-25 N 2500 6,0 13,4 11,9 8,4 97 9,2 Clear 12-17 N 2500 6,0 13,4 11,9 8,4 97 9,6 Clear 12-18 N 2500 6,0 12,3 11,7 8,5 97 9,6 Pt, Cloudy 15 N 2500 8,0 12,3 11,7 8,5 97 9,6 Pt, Cloudy 15 N 2500 8,0 12,3 11,7 8,5 97 8,9 Pt, Cloudy 15 N 2500 8,0 12,3 11,7 8,5 97 8,9 Pt, Cloudy 15 N 2500 8,0 12,3 11,7 8,5 97 8,9 Pt, Cloudy 15 N 2500 8,0 12,5 12,7 8,5 95 8,5 S,0 Clear 12-18 N 2500 8,0 12,5 12,7 8,5 95 8,5 Clear 12-18 N 2500 10,0 12,5 12,7 8,5 95 8,5 Clear 12-18 N 2500 8,0 12,2 12,7 8,5 95 8,5 Clear 12-18 N 2500 8,0 12,5 12,7 8,5 95 8,5 Clear 12-18 N 2500 8,0 12,5 12,5 8,6 95 8,0 Clear 12-18 N 250-25 N	1700 19.5 16.8 14.5 8.6 94 8.2 Sun Spotty 1800 19.0 17.5 15.3 8.4 96 8.3 100% Cloud 1900 18.0 16.5 14.4 8.3 95 7.7 Rain 2100 18.0 16.4 13.7 8.3 95 7.7 Rain 2100 18.0 16.4 11.1 8.3 95 7.7 Rain 2200 18.0 16.4 11.9 8.3 95 7.7 Clear 2200 18.0 16.0 15.8 11.9 8.3 96.5 8.0 Clear 2300 16.0 14.9 11.2 8.4 96 8.0 Clear 0200 9.0 14.2 11.2 8.4 98 8.9 Clear 0400 7.0 13.6 12.2 8.5 96 9.0 Clear 0400 7.0 13.6 12.2 8.5 96 9.0 Clear 0500 6.0 13.4 11.9 8.4 97 9.2 Clear 0500 6.0 13.4 11.9 8.4 97 9.2 Clear 0500 6.0 13.5 11.7 8.5 97 9.2 Clear 0500 6.0 13.4 11.9 8.4 97 9.2 Clear 0500 6.0 13.5 11.7 8.5 97 9.2 Clear 0500 8.0 12.3 11.7 8.5 97 9.2 Clear 0500 8.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 0900 8.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1000 10.0 14.3 12.7 8.5 97 8.4 Pt. Cloudy 1100 12.5 12.5 8.6 93 8.0 Clear 1200 12.5 12.5 8.6 93 8.0 Clear		1600	20°0	Ŷ,	4,	•	94	•	Sun Spotty	~
1800 19.0 17.5 13.3 8.4 96 8.3 100% Cloud 0-5 - 1900 18.0 16.5 14.4 8.3 95 7.7 Rain 0-5 - 100 18.0 16.4 13.7 8.3 95 7.7 Rain 0-5 - 100 18.0 16.4 11.9 8.3 95 7.7 Rain 5-10 8 10.0 18.0 16.4 11.9 8.3 95 7.7 Rain 5-10 N 10.1 18.0 16.4 11.9 8.3 97 7.7 Clear 10-15 N 10-15 N 10.0 11.0 14.9 11.5 8.3 97 7.7 Clear 10-15 N 13-17 N 10.0 11.0 14.8 11.5 8.3 96.5 8.3 Clear 11.2 17.2 N 12.2 N 12.2 8.3 96.5 8.3 Clear 11.2 17.2 N 12.2 N	1800 19.0 17.5 13.3 8.4 96 8.3 100% Cloud 1900 18.0 16.5 14.4 8.3 95 7.7 Rain 2000 18.0 16.4 13.7 8.3 95 7.7 Rain 2100 18.0 16.4 11.3 8.3 95 7.7 Rain 2200 18.0 16.4 11.9 8.3 95 7.7 Clear 2200 18.0 16.4 11.9 8.3 97 7.7 Clear 2200 18.0 16.4 11.9 8.3 97 7.7 Clear 2200 18.0 14.9 12.2 8.3 97 7.7 Clear 3200 10.0 11.0 14.8 11.5 8.4 98 8.0 Clear 3200 8.0 13.7 12.3 8.4 98 8.9 Clear 3200 6.0 13.4 11.5 8.5 97 9.6 Pt. Cloudy 3200 8.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 3200 8.0 13.0 12.4 8.4 97 8.5 97 9.5 Pt. Cloudy 1100 8.5 13.0 12.7 8.5 8.5 97 8.5 S1. Cloudy 1100 12.5 11.5 8.5 8.5 97 8.5 S1. Cloudy 1100 12.5 11.5 8.5 8.6 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 97 8.5 S1. Cloudy 1100 12.5 11.5 8.5 8.5 97 8.5 S1. Cloudy 1100 12.5 11.5 8.5 8.6 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 97 8.5 S1. Cloudy 3200 6.0 12.5 11.5 8.5 8.6 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 95 8.5 8.5 S1. Cloudy 3200 6.0 12.5 11.5 8.5 8.6 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.6 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.6 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 93 8.0 Clear 3200 6.0 6.0 12.5 11.5 8.5 93 8.0 Clear 3200 6.0 6.0 1		1700	Ų١	ŷ	4		94		Sun Spotty	
1900 18.0 16.5 14.4 8.3 95 7.7 Rain 0-5 -10 S  2000 18.0 16.4 13.7 8.3 95 7.7 Rain 5-10 S  2100 18.0 16.4 11.1 8.3 95 7.7 Rain 5-10 N  2200 18.0 16.4 11.9 8.3 95 7.7 Clear 10-15 N  2200 18.0 15.8 11.9 8.3 97 7.6 Clear 10-15 N  2400 13.0 14.9 12.2 8.3 96 8.0 Clear 11-15 N  0200 9.0 14.2 11.2 8.4 98 8.9 Clear 17-25 N  0400 7.0 13.6 12.2 8.4 98 8.9 Clear 17-17 N  0500 6.0 13.4 11.9 8.4 98 8.9 Clear 15-18 N  0500 6.0 13.4 11.9 8.4 98 8.9 Clear 15-18 N  0500 6.0 13.4 11.9 8.4 98 8.9 Clear 15-18 N  0500 6.0 12.9 11.5 8.4 98 8.9 Clear 15-18 N  0500 6.0 12.9 11.5 8.4 98 8.9 Clear 15-18 N  0500 6.0 12.9 11.5 8.4 98 8.9 Clear 15-18 N  0500 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 15-10 N  0500 8.0 12.9 11.7 8.5 97 8.4 Pt. Cloudy 15-10 N  0500 8.0 12.9 12.7 8.5 8.6 95 8.9 Clear 15-18 N  0500 12.9 12.5 12.5 8.6 95 8.5 S1. Cloudy 15-20 N  1100 10.0 14.3 12.7 8.5 8.6 95 8.5 Clear 15-10 N	1900       18.0       16.5       14.4       8.3       95       7.7       Rain         2000       18.0       16.4       13.7       8.3       95       7.7       Rain         2100       18.0       16.4       11.1       8.3       97       7.7       Rain         2200       18.0       16.4       11.9       8.3       97       7.7       Clear         2200       18.0       16.9       11.9       8.3       97       7.6       Clear         2400       13.0       14.9       12.2       8.3       96       8.0       Clear         January       0100       11.0       14.8       11.2       8.4       98       8.0       Clear         January       0100       11.0       14.2       11.2       8.4       98       8.0       Clear         January       0100       11.0       14.2       11.2       8.4       98       8.0       Clear         January       0100       11.0       14.2       11.2       8.4       98       8.0       Clear         January       0100       11.2       11.2       8.4       96       8.9       Clear <t< td=""><td></td><td>1800</td><td>•</td><td>7,</td><td>พื</td><td></td><td>96</td><td></td><td>100% Cloud</td><td></td></t<>		1800	•	7,	พื		96		100% Cloud	
2000         18.0         16.4         13.7         8.3         92         8.0         Rain         5-10         8           2100         18.0         16.7         11.1         8.3         95         7.7         Rain         5-10         N           2200         18.0         16.4         11.9         8.3         97         7.7         Clear         5-10         N           2300         16.0         15.8         11.9         8.3         96         8.0         Clear         10-15 N           2400         13.0         14.9         12.2         8.3         96.5         8.3         Clear         17-25 N           Jamuary         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-25 N           Jamuary         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-15 N           Jamuary         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-15 N           Jamuary         0100         13.4         11.9         8.4         98         8.9         Clear	2000       18.0       16.4       15.7       8.3       92       8.0       Rain         2100       18.0       16.7       11.1       8.3       95       7.7       Rain         2200       18.0       16.4       11.9       8.3       97       7.7       Clear         2300       16.0       16.0       16.4       11.9       8.3       96       8.0       Clear         2400       13.0       14.9       12.2       8.3       96       8.0       Clear         2400       13.0       14.9       11.5       8.3       96.5       8.3       Clear         3anuary       0100       11.0       14.8       11.2       8.4       98       8.9       Clear         0500       9.0       14.2       11.2       8.4       96       8.9       Clear         0500       6.0       13.4       11.9       8.4       97       9.2       Clear         0500       6.0       13.4       11.9       8.4       98       9.0       Clear         0500       6.0       13.2       11.9       8.4       98       9.0       Clear         0500       6.0       1		1900	~	ŷ	4,		95	^	Rain	
2100         18.0         16.4         11.1         8.3         95         7.7         Rain         5-10         N           2200         18.0         16.4         11.9         8.3         97         7.7         Clear         5-10         N           2200         16.0         15.8         11.9         8.3         96         8.0         Clear         10-15         N           1960         13.0         14.9         11.5         8.3         96.5         8.3         Clear         12-17         N           January         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-25         N           January         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-25         N           January         0400         5.0         13.4         11.9         8.4         98         8.0         Clear         17-15         N           January         0400         5.0         13.4         11.9         8.4         98         8.9         Clear         12-15         N           0500         6.0         13.4	2100       18.0       16.7       11.1       8.3       95       7.7       Rain         2200       18.0       16.4       11.9       8.3       97       7.7       Clear         2200       16.0       15.8       11.9       8.3       97       7.6       Clear         2400       15.0       14.9       12.2       8.3       96.5       8.0       Clear         January       0100       11.0       14.8       11.5       8.3       96.5       8.3       Clear         January       0100       11.0       14.2       11.2       8.4       98       8.9       Clear         January       0100       15.7       12.3       8.4       98       8.9       Clear         January       0100       15.7       12.2       8.4       98       8.9       Clear         January       0500       6.0       15.4       11.9       8.4       98       8.9       Clear         0500       6.0       15.4       11.9       8.4       98       8.9       Clear         0500       6.0       15.9       11.5       8.5       97       9.5       Pt. Cloudy <td< td=""><td></td><td>2000</td><td>~</td><td>ŝ</td><td>W</td><td></td><td>. 65</td><td></td><td>Rain</td><td></td></td<>		2000	~	ŝ	W		. 65		Rain	
2200         18.0         16.4         11.9         8.3         97         7.7         Clear         5-10         N           2300         16.0         15.8         11.9         8.3         97         7.6         Clear         10-15         N           1960         13.0         14.9         12.2         8.3         96.5         8.0         Clear         10-15         N           January         0100         11.0         14.8         11.5         8.3         96.5         8.3         Clear         17-25         N           January         0100         11.0         14.2         11.2         8.4         98         8.9         Clear         17-25         N           0500         8.0         13.7         12.3         8.4         98         8.9         Clear         14-16         N           0500         6.0         13.4         11.9         8.4         97         9.6         9.0         Clear         15-18         N           0500         6.0         13.4         11.9         8.4         97         9.6         9.0         Clear         15-18         N           0500         6.0         13.5	2200 18.0 16.4 11.9 8.3 97 7.7 Clear 2300 16.0 15.8 11.9 8.3 97 7.6 Clear 2400 13.0 14.9 12.2 8.3 96 8.0 Clear 2400 13.0 14.9 11.5 8.4 98 8.9 Clear 0200 9.0 14.2 11.2 8.4 98 8.9 Clear 0400 7.0 13.6 12.2 8.5 96 9.0 Clear 0500 6.0 13.4 11.9 8.4 98 8.9 Clear 0500 6.0 13.2 11.9 8.4 98 8.9 Clear 0500 6.0 13.2 11.9 8.4 98 8.9 Clear 0500 6.0 13.2 11.9 8.4 98 8.9 Clear 0500 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 0900 8.0 12.9 12.5 8.5 97 9.5 Pt. Cloudy 1000 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 1100 10.0 14.3 12.7 8.5 95 8.5 S1. Cloudy 1200 12.5 12.5 8.6 93 8.6 Clear		2100	ထိ	9	ı.		95		Raîn	
2500         16.0         15.8         11.9         8.3         97         7.6         Clear         10-15 N           2400         13.0         14.9         12.2         8.3         96         8.0         Clear         15-17 N           3amuary         0100         11.0         14.8         11.5         8.4         98         8.3         Clear         17-25 N           0200         9.0         14.2         11.2         8.4         98         8.9         Clear         17-25 N           0300         8.0         13.7         12.3         8.4         98         8.9         Clear         17-17 N           0400         7.0         13.4         11.9         8.4         98         9.0         Clear         15-18 N           0500         6.0         13.4         11.9         8.4         98         9.2         Clear         15-18 N           0700         6.0         12.9         11.5         8.4         98         9.5         Pt. Cloudy         12-18 N           0800         6.0         12.3         11.7         8.5         9.5         Pt. Cloudy         15-18 N           1000         8.5         13.0	2300         16.0         15.8         11.9         8.3         97         7.6         Clear           2400         13.0         14.9         12.2         8.3         96         8.0         Clear           January         0100         11.0         14.8         11.5         8.4         98         8.0         Clear           0200         9.0         14.2         11.2         8.4         98         8.0         Clear           0300         8.0         13.7         12.3         8.4         98         8.9         Clear           0500         6.0         13.4         11.9         8.4         97         9.2         Clear           0500         6.0         13.4         11.9         8.4         97         9.2         Clear           0500         6.0         13.2         11.5         8.5         97         9.5         Pt. Cloudy           0800         6.0         12.3         11.7         8.5         97         9.3         Pt. Cloudy           1000         8.5         15.0         12.4         8.6         97         8.5         S1. Cloudy           1100         12.5         15.2         12.5		2200	ထိ	ŷ	Ļ		97		Clear	
1960         14.9         12.2         8.3         96.5         8.0         Clear         15-17 N           January         0100         11.0         14.8         11.5         8.4         96.5         8.3         Clear         17-25 N           January         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-25 N           0200         9.0         13.7         12.3         8.4         98         8.9         Clear         12-17 N           0400         7.0         13.6         12.2         8.5         96         9.0         Clear         12-17 N           0500         6.0         13.4         11.9         8.4         98         8.9         Clear         12-18 N           0700         6.0         13.2         11.5         8.5         97         9.6         Pt. Cloudy         12-18 N           0800         6.0         12.3         11.7         8.5         97         9.5         Pt. Cloudy         15-18 N           1000         8.5         13.0         12.4         8.4         97         8.4         Pt. Cloudy         15-18 N           1100         10.0 <td>1960       15.0       14.9       12.2       8.3       96.5       8.0       Clear         Jamuary       0100       11.0       14.8       11.5       8.4       98       8.0       Clear         0200       9.0       14.2       11.2       8.4       98       8.9       Clear         0500       8.0       15.7       12.3       8.4       98       8.9       Clear         0500       6.0       15.4       11.9       8.4       97       9.0       Clear         0500       6.0       15.4       11.9       8.4       98       8.9       Clear         0500       6.0       15.2       11.9       8.4       98       8.9       Pt. Cloudy         0800       6.0       12.9       11.5       8.5       97       9.5       Pt. Cloudy         0900       8.0       15.0       12.4       8.4       97       8.9       Pt. Cloudy         1100       10.0       14.3       12.7       8.5       95       8.5       S1. Cloudy         1200       12.5       12.5       8.6       95       8.5       S1. Cloudy</td> <td></td> <td>2300</td> <td>ŷ</td> <td>ď</td> <td>r.</td> <td></td> <td>26</td> <td>•</td> <td>Clear</td> <td></td>	1960       15.0       14.9       12.2       8.3       96.5       8.0       Clear         Jamuary       0100       11.0       14.8       11.5       8.4       98       8.0       Clear         0200       9.0       14.2       11.2       8.4       98       8.9       Clear         0500       8.0       15.7       12.3       8.4       98       8.9       Clear         0500       6.0       15.4       11.9       8.4       97       9.0       Clear         0500       6.0       15.4       11.9       8.4       98       8.9       Clear         0500       6.0       15.2       11.9       8.4       98       8.9       Pt. Cloudy         0800       6.0       12.9       11.5       8.5       97       9.5       Pt. Cloudy         0900       8.0       15.0       12.4       8.4       97       8.9       Pt. Cloudy         1100       10.0       14.3       12.7       8.5       95       8.5       S1. Cloudy         1200       12.5       12.5       8.6       95       8.5       S1. Cloudy		2300	ŷ	ď	r.		26	•	Clear	
1960         Olto         11.0         14.8         11.5         8.3         96.5         8.3         Clear         12-17 N           Jamuary         0100         11.0         14.2         11.2         8.4         98         8.0         Clear         17-25 N           0200         9.0         13.7         12.3         8.4         98         8.9         Clear         12-17 N           0400         7.0         13.6         12.2         8.5         96         9.0         Clear         14-16 N           0500         6.0         13.4         11.9         8.4         98         8.9         Clear         15-18 N           0700         6.0         13.2         11.9         8.4         98         8.9         Clear         12-18 N           0800         6.0         12.9         11.5         8.5         97         9.6         Pt. Cloudy         15         N           0900         8.0         13.0         12.4         8.4         97         8.9         Pt. Cloudy         16         N           1100         8.5         13.0         12.0         8.6         97         8.4         Pt. Cloudy         16         N	1960         0100         11.0         14.8         11.5         8.3         96.5         8.3         Clear           January         0200         9.0         14.2         11.2         8.4         98         8.0         Clear           0500         8.0         13.7         12.3         8.4         98         8.9         Clear           0400         7.0         13.6         12.2         8.5         96         9.0         Clear           0500         6.0         13.4         11.9         8.4         97         9.2         Clear           0600         6.0         13.2         11.9         8.4         98         8.9         Clear           0700         6.0         12.9         11.5         8.5         97         9.6         Pt. Cloudy           0800         6.0         12.3         11.7         8.5         97         9.3         Pt. Cloudy           0900         8.0         13.0         12.4         8.6         97         8.4         Pt. Cloudy           1100         10.0         14.3         12.7         8.5         95         8.5         8.0         Clear           1200         12.5		2400	'n	4,			96	•	Clear	
January         0100         11,0         14,8         11,5         8,3         96,5         8,3         Clear         12-17 N           0200         9,0         14,2         11,2         8,4         98         8,9         Clear         17-25 N           0300         8,0         13,7         12,3         8,4         98         8,9         Clear         12-17 N           0400         7,0         13,6         12,2         8,4         96         9,0         Clear         14-16 N           0500         6,0         13,2         11,9         8,4         98         8,9         Clear         15-18 N           0700         6,0         12,9         11,5         8,5         97         9,6         Pt, Cloudy         15-15 N           0800         6,0         12,3         11,7         8,5         9,7         9,5         Pt, Cloudy         15         N           1000         8,0         13,0         12,4         8,4         97         8,9         Pt, Cloudy         15         N           1100         8,5         13,0         14,3         12,7         8,5         8,5         8,5         8,6         9,6         Pt, Cloud	January         0100         11.0         14.8         11.5         8.3         96.5         8.3         Clear         1           0200         9.0         14.2         11.2         8.4         98         8.0         Clear         1           0300         8.0         13.7         12.3         8.5         96         9.0         Clear         1           0400         7.0         13.6         12.2         8.5         96         9.0         Clear         1           0500         6.0         13.4         11.9         8.4         97         9.2         Clear         1           0700         6.0         12.9         11.5         8.5         97         9.6         Pt. Cloudy         1           0800         6.0         12.3         11.7         8.5         97         9.5         Pt. Cloudy         1           1000         8.6         13.0         8.6         97         8.4         Pt. Cloudy         1           1100         10.0         14.3         12.7         8.5         8.5         8.5         8.5         8.5         8.6         8.5         8.6         8.5         8.6         8.5         8.6	1960									
9.0 14.2 11.2 8.4 98 8.0 Clear 17-25 N 8.0 13.7 12.3 8.4 98 8.9 Clear 12-17 N 12.3 8.4 98 8.9 Clear 12-17 N 12.1 N 12.2 8.5 96 9.0 Clear 14-16 N 6.0 13.4 11.9 8.4 97 9.2 Clear 15-18 N 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 12-15 N 8.5 97 9.3 Pt. Cloudy 15 N 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 16 N 8.5 12.0 N 12.0 8.6 97 8.5 S1. Cloudy 15 N 12.5 N 12.5 N 12.7 8.5 8.5 8.6 S1. Cloudy 15 N 12.5 N 12.5 N 8.5 95 8.5 S1. Cloudy 15 N 12.5 N 12.5 N 12.5 S 8.6 93 8.0 Clear 20-25 N	9.0 14.2 11.2 8.4 98 8.0 Clear 1 8.0		0100	e Fel	٥	•			۰	Clear	2-17
8.0 13.7 12.3 8.4 98 8.9 Clear 12-17 N 7.0 13.6 12.2 8.5 96 9.0 Clear 14-16 N 6.0 13.4 11.9 8.4 97 9.2 Clear 15-18 N 6.0 12.9 11.9 8.4 98 8.9 Clear 15-18 N 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 12-15 N 8.5 97 9.3 Pt. Cloudy 15-N 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 15-N 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 N 12.5 12.5 8.6 93 8.0 Clear 20-25 N	8.0 13.7 12.3 8.4 98 8.9 Clear 1 7.0 13.6 12.2 8.5 96 9.0 Clear 1 6.0 13.4 11.9 8.4 97 9.2 Clear 1 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 1 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0200	0°6	4,	۰	0	86	۰	Clear	7-25
7.0 13.6 12.2 8.5 96 9.0 Clear 14-16 N 6.0 15.4 11.9 8.4 97 9.2 Clear 15-18 N 6.0 15.4 11.9 8.4 97 9.2 Clear 15-18 N 6.0 13.2 11.9 8.5 97 9.6 Pt. Cloudy 12-15 N 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 15 N 8.5 15.0 12.4 8.4 97 8.9 Pt. Cloudy 16 N 8.5 15.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 N 15-20 N 15-20 N 15-20 N 15.2 12.5 8.6 93 8.0 Clear 20-25 N	7.0 13.6 12.2 8.5 96 9.0 Clear 1 6.0 13.4 11.9 8.4 97 9.2 Clear 1 6.0 13.2 11.9 8.4 98 8.9 Clear 1 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 1 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0200	8°0	'n	4	8,4	86	۰	Clear	2-17
6.0 13.4 11.9 8.4 97 9.2 Clear 15-18 N 6.0 13.2 11.9 8.4 98 8.9 Clear 12-18 N 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 12-15 N 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 15 N 8.9 Pt. Cloudy 15 N 8.5 13.0 12.4 8.4 97 8.4 Pt. Cloudy 15-20 N 10.0 14.3 12.7 8.5 95 8.5 S1. Cloudy 15 N 12.5 N 12.5 S1. Cloudy 15 N 12.5 N 12.5 S1. Cloudy 15 N 15-20 N 15.5 N 12.5 S1. Cloudy 15 N 15-25 N 12.5 N 12.5 S1.5 N 15.5 N	6.0 13.4 11.9 8.4 97 9.2 Clear 1 6.0 13.2 11.9 8.4 98 8.9 Clear 1 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 1 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 1 12.5 15.2 12.5 8.6 93 Clear 2		0400	7.0	'n	٥	∞ ₽	96	٠	Clear	4-16
6.0 13.2 11.9 8.4 98 8.9 Clear 12-18 N 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 12-15 N 6.0 12.9 11.7 8.5 97 9.5 Pt. Cloudy 15 N 8.0 12.4 8.4 97 8.9 Pt. Cloudy 15 N 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 N 10.0 14.3 12.7 8.5 95 8.5 S1. Cloudy 15 N 12.5 N 12.5 8.6 93 8.0 Clear 20-25 N	6.0 13.2 11.9 8.4 98 8.9 Clear 1 6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 1 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 S1. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0200	6,0	'n	0	8.4	26	۰	Clear	5-18
6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 12-15 N 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 15 N 8.0 12.4 8.4 97 8.9 Pt. Cloudy 15 N 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 N 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 15 N 12.5 Sl. Cloudy 15 N 15.5 N 12.5 Sl. Cloudy 15 N 15.5 N 12.5 Sl. Cloudy 15 N 15.5	6.0 12.9 11.5 8.5 97 9.6 Pt. Cloudy 1 6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 S1, Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0090	0°9	'n	٠	8,4	98	φ.	Clear	2-18
6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 15 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 16 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 15 12.5 15.2 8.6 93 8.0 Clear 20-25	6.0 12.3 11.7 8.5 97 9.3 Pt. Cloudy 1 8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0200	6.0	ŝ	۰	ຜູກ	26	•	•	2-15
8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 16 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 15 12.5 15.2 12.5 8.6 93 8.0 Clear 20-25	8.0 13.0 12.4 8.4 97 8.9 Pt. Cloudy 1 8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0800	0.9	å	0	ക	26	٥	۰	5
8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 15-20 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 15 20-25 12.5 12.5 8.6 93 8.0 Clear 20-25	8.5 13.0 12.0 8.6 97 8.4 Pt. Cloudy 1 10.0 14.3 12.7 8.5 95 8.5 Sl. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2		0060	8°0	'n		8.4	26	۰	٥	9
10.0 14.3 12.7 8.5 95 8.5 SI, Cloudy 15 12.5 15.2 12.5 8.6 93 8.0 Clear 20-25	10.0 14.3 12.7 8.5 95 8.5 SI. Cloudy 1 12.5 15.2 12.5 8.6 93 8.0 Clear 2	4	1000	۰	'n	٥	Ú	26	•		5-20
200 12.5 15.2 12.5 8.6 93 8.0 Clear 20-25	200 12.5 15.2 12.5 8.6 93 8.0 Clear 2		1100	ô	4°	۰		95	•	Sl. Cloudy	r.
				2	'n	٥	a	93	0		0-25

+0°7 +0°4 0

1-29-60

Tide

Diurnal Oxygen Curve - Laboratory Bulkhead During Gymnodinium splendens Bloom. September 1960

Date	Time	Temp. Air	р. С <sup>о</sup> Н <sub>2</sub> о	00	hď	Turb.	Sal.	Cloud	Wind Rate	ld Dir.	Bar Pressure	Tide	Comments
9-21-60	0800				7.6	95	,	20%	0-5	E-NE	IO	8	Rodow,
	0060	29 0	29.5	2.9	7.6	95	11.7	30%	5-10	E E	29.96		, <b>G</b> BJ
	1000	•			7.7	95		30%	0-5	E-NE	O	8,1	
	1100	•			7.8	96		20%	5~10	E-NE	9	1,7	
	1200				8,3	06	6	20%	10-12	团	(C)		pH meter erratic
	1300	•			8° 7°	88	≓	20%	12-14	[22]	29.96		water getting rougher
	1400	۰		Ċ,	8°4	88	11,8	20%	8-16	E-NE	29.94	9	)
	1500	•		å	8,4	87	11,7	15%	10-20	E-SE	29.94	1,6	
	1600	•		Ĵ	& %	87	11.7	10%	10-20	E.SE	29,90	H N	
	1700	•		ő	ຮຸ	87	11.8	0	14	SE	29,90	1,7	
	1800				8,3	89	11.9	0	13	SE	29,90	1,8 Sunset	set 1815
	1900				8,2	89	11,8	0	9	SE	29.91	ထ္	
	2000	•			8°1	91	12,1	0	īU	SE	29,91	0,	
	2100	-			8,0	92	12.0	0	0.5	SE	29.92	1,9	
	2200	-			7.9	95	11.9	0		SE		1,9	
7.7	2300	-			7.75	66	11.7	0	0-5	SE		1,8	
·	2400			2.1	7.7	95	11.7	0		SE	•	1,8 Calm	8
9-2560	0100	4,	٥	٥	•	95	٥	0	0 10	S	29,92	1,7 Calm	8
	0200	24.0	29.0	Ę,	7,55	95	-	0	9-0	SE	29.92		n, Mist over water
	0200	'n	9	Ġ	٥	95	11,6	0	0-5	SE	۰		
	0400	'n	•	0	٠	95	~~1	0		SE			
	0200	ð	٠		•	93	11,7	0		SE		1,7	
	0090	ď	٠	0	٠	93	٠	2%		NW	۰	٥	
	0200	ń	۰		۰	93	11.7	5%	0-5	NW	29.91	1,9	
	0800	7	q	٠	•	95	ŗ	50 %		N	۰	•	
										,			

	Tal	Table 8	- Hydrogra	ographic	Data -	Area M-2	•	-				
	Nov。	Dec.	Jan.	Feb.	Mar。	Apr.	May	June	July	Aug.	Sept.	Oct.
Air Temp. Oc												
Max。	24.4	20.8	17,2	17.0	24.8	ŷ.	30.0		W.	•		o,
Mın.	T	ဝ ့	0.2	۰	rU.	17,2	22.0	25,5	25,2	26,4	۰	M
AVg。	13.2	15,0	ص س	•	14.0	ċ	25.6	٠	တိ	29.6	27,2	23.0
Water Temp, <sup>O</sup> C												
Surface: Max,	16.7	16.4	16,2	۰		•			ıc	М		
Mîn,	7.9	9°8	6.0		, F.		•	•	ια	٠,	9	•
	13,2	13,4	10.5	۰	M	•		•	, ,	° c	9	œ
Bottom: Max.	16,2	16,2	12,2		a			, (	4	• ~	0	٥
Mîn。	7.4	8,9	5,0	8,5	7.4	16.0	20,8	26,2	28,3	Iα	• •	•
Avg。	12,5	12,5	9.6	۰	4	۰	0		°	• 0	27.2	26.0
Salinity 0/00												
Surface: Max,	16,74	23,21	12,72	12,90	17.44	α		C	_	c	Ē	
Min。	2,90	0,40	0,20	9 (	c	, c	°-	יור ה	t c	э у L	٦ ١	4
Avg。	10,90	12,50	4,80	, ,	a (	, ה	, c	, א טַר	γ α	, L	9 0	•
Bottom:	21,73	25,49	22,12	· _ (		ģ	•	å rc	္ဝ	رة م	ďΝ	٥
	2.90	1,50	0,20	9 . 4	ď	מו	, ,	, rc	Å	) r	י מס	
	13,10	13,20	6,80	7,60	8,90	11,00	12,30	14,70	8,30	11,50	12,35	12.50
Ħ									,	•	i •	•
Surface Max	α	1	0									
	o o	7 0 7	, t	۵	e	٠	0	0	•	۰	Q	ю М
\$1771.0 \$1.00	, to	, , ,	, , , , , , , , , , , , , , , , , , ,	0	٠	9	٠	۰	4	•	7.4	6°9
Bo++08 % Moss	- N	1,0	Q 1	٥	9	•	٠	4	۰		Ç	7.8
	η', α'	ر پر	ສຸເ ຜູ້	_	•	6	٠	•	٠	•	٥	8,3
AVE.	7.7	, r,	7°,7	7 ,7	7,50	m. /	7,1 7,8	۲.۷	7.0	m, α	7,4	7.0
Turbidity %				٠		•	•	D.	a	<b>o</b> -	G	•
••	86	86	66	66	66	00	100	ä	7	ć	ć	ó
Min。	83	5	43	100	, 99	8	> .α	56	, ,	w 0	y 0	y II
AVE.	. 16	06	87	6	91	76	3 6	0 H	7 0	о с у п	y 0	200
Bottom: Max.	96	86	66	66	100	86	100	3 %	0.0	000	0 0	4 0
Min.	96	89	40	39	99	84	~	77	79	\ c	\ \ \ \ \	7 7
Avg。	96	89	83	85	91	94	95	93	88	95	93	92
DO °/000												
Surface: Max.	15,3	9,3	18,9	10,8	11,0	10.6	•			7		701
Min.	1,5	5,0	4.6	۰	$\sim$	_	ı	5 6	, <sub>-</sub>	0		° c
Avg.	10.5	7.9	و ئ	0°6	9,4	7.7	0.8	6.7	6.4	6,5	7.2	7.6

Figure I

Hydrographic System Area M-2

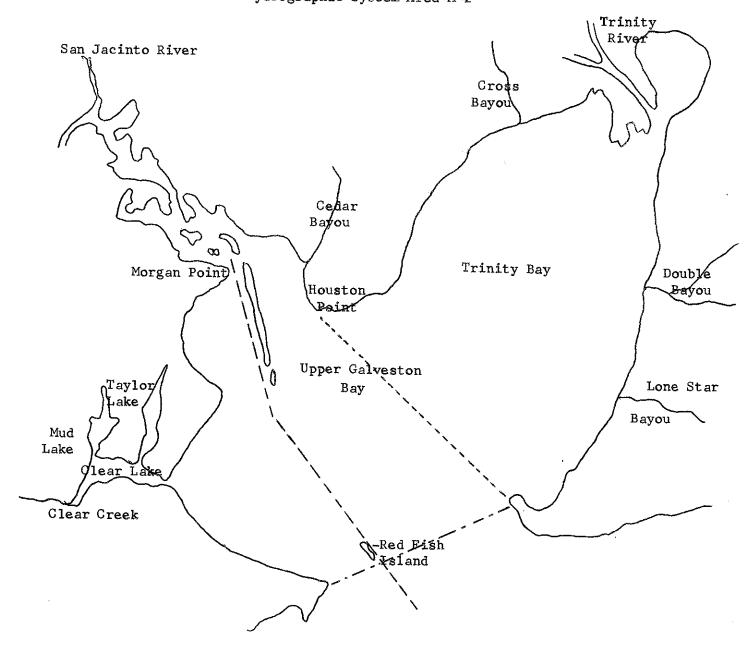
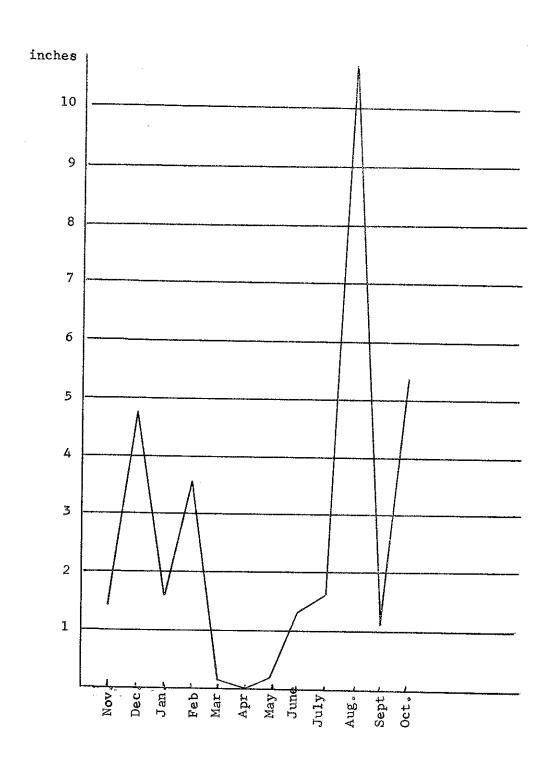


Figure II
Precipitation Average Per Month



ਲਿਆਰੀ ਫਿਲਾਡਨ ਵ

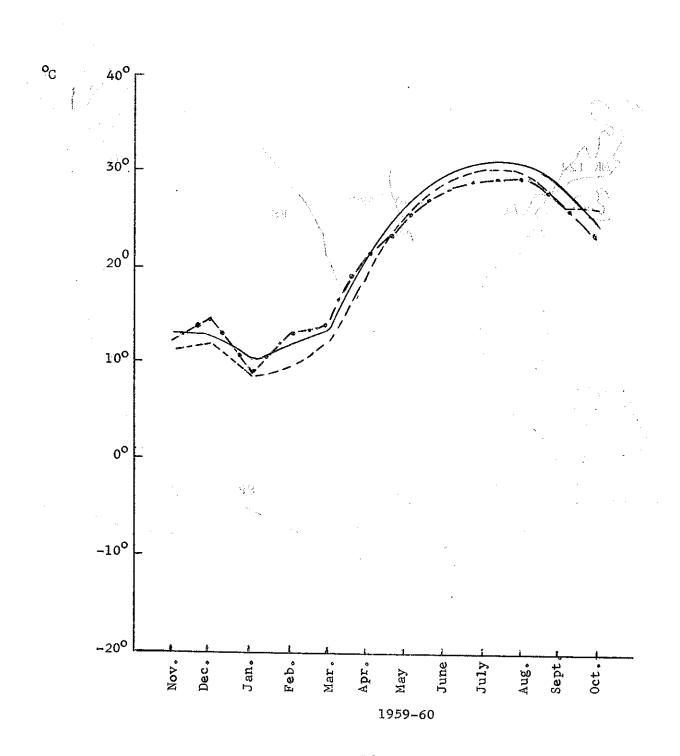


Figure IV
Salinity Stations - Area M-2

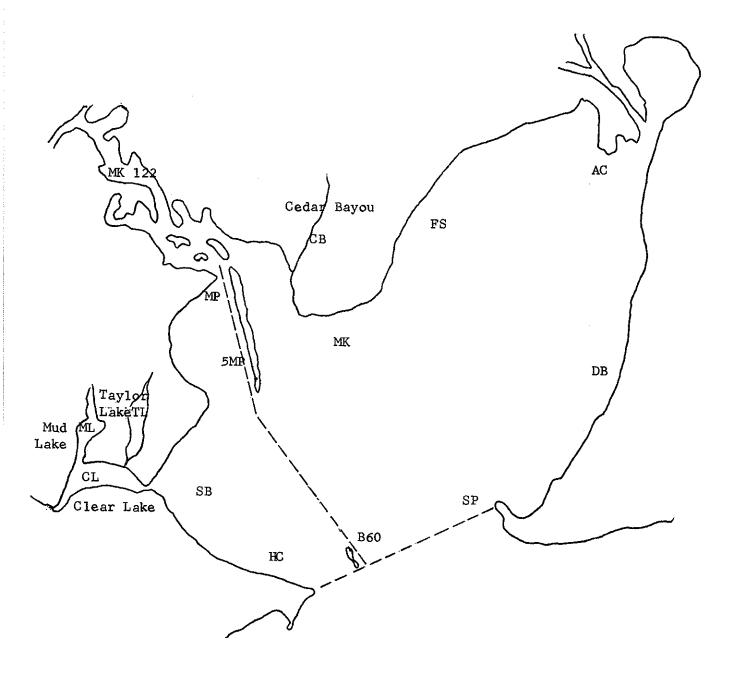


Figure V

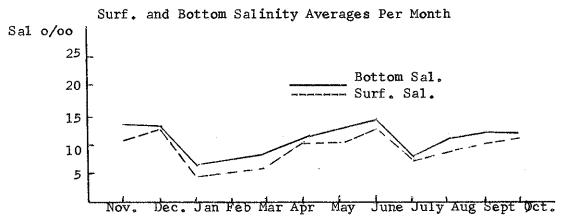


Figure VI

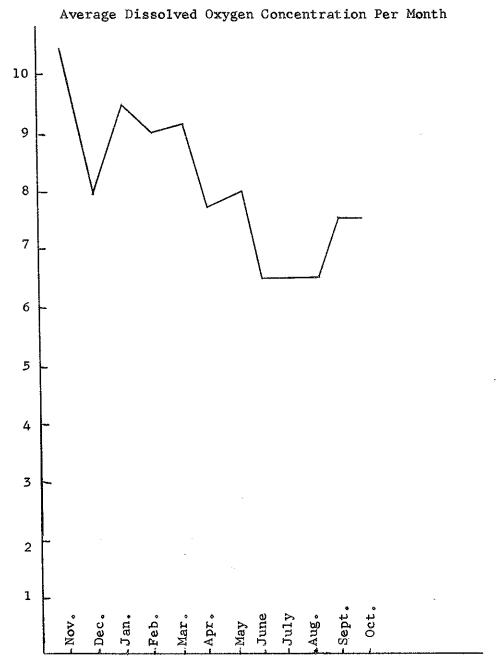


Figure VII

Average Turbidity Per Month

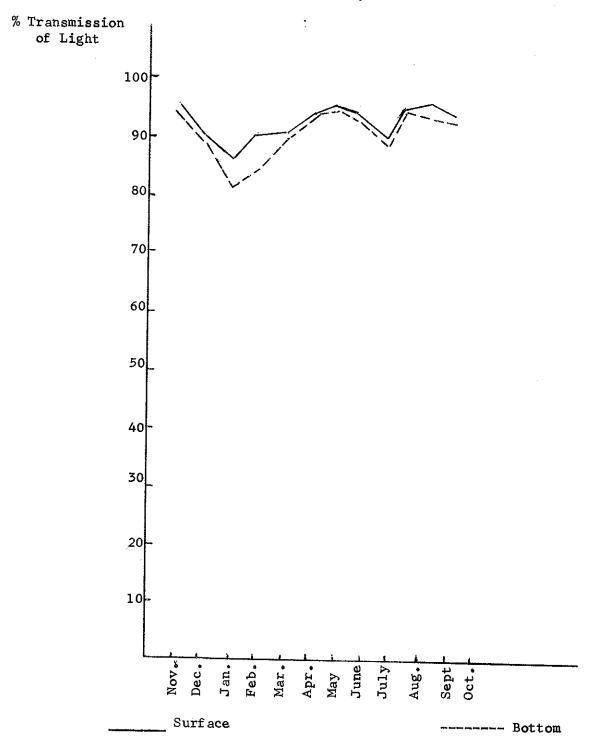
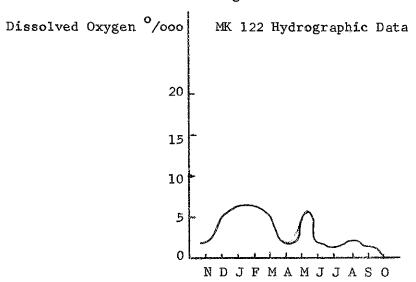
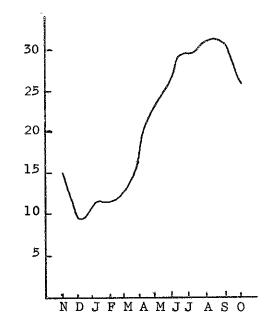


Figure VIII



Water Temp, CO.



Salinity 0/00

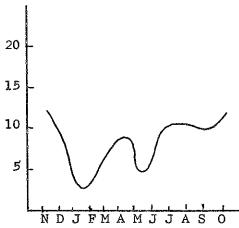


Figure IX
Fish kill in vicinity of Morgan Point and Scotts Reef, June 28, 1960.

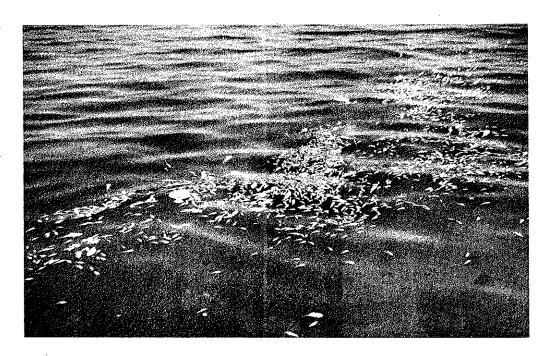


Figure X
Closer view of the same kill shows some of the 10 different species.

