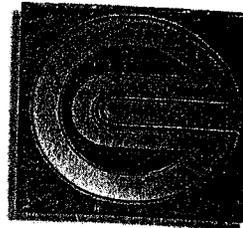


January 19, 2000



COASTAL
ENGINEERING ASSOCIATES INC.

Mr. Don DePra, Environmental Specialist II
Florida Department of Environmental Protection
Water Management Program
3804 Coconut Palm Drive
Tampa, Florida 33619

D.E.P.
JAN 20 2000
Southwest District Tampa

RE: Bayport Channel Third Sea Grass Monitoring Report
FDEP No.: 27-1422133
CEA Job No: 92046-10C

Dear Mr. DePra:

Attached are three (3) copies of the Bayport Channel Third Monitoring Report. Monitoring data for this report were collected on December 7, 1999.

In other related matters, please advise us of the status of the Hernando Beach Park monitoring report and the proposed Brazilian pepper eradication plan (FDEP C.O. No.: 93-0373). The monitoring report and eradication plan were forwarded to you on November 9, 1999.

If you have any questions, please call.

Sincerely,

COASTAL ENGINEERING ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read 'D. McAlpine'.

DAVID McALPINE
Environmental Specialist

cc: Pat Fagan, Hernando County Community Service (2 copies of report)
U.S. Corps of Engineers, Regulation Division-Enforcement Branch, P.O. Box 4970, Jacksonville,
FL 32232-0019 (1 copy of report)

Engineering • Planning • Environmental • Construction Management • Transportation

966 Candlelight Boulevard • Brooksville, Florida 34601
352-796-9423 • Fax 352-799-8359
e-mail: coastal@coastal-engineering.com

25th Anniversary



1974 - 1999

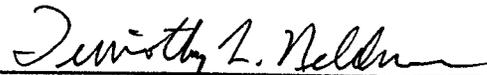
Biological Research Association

**HERNANDO COUNTY DEPARTMENT OF PUBLIC WORKS
BAYPORT CHANNEL
THIRD SEA GRASS MONITORING REPORT
FDEP Permit No. 271422133**

Prepared for:

Hernando County
Department of Public Works
4146 Pine Dale Court
Hernando Beach, Florida 34607-2953


Christopher M. Gasinski
Environmental Manager


Timothy L. Neldner, PWS
Vice President

F:\4637\001\b62\seagrass rpt.wpd

11 January 2000

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INTRODUCTION / PROJECT HISTORY

On September 16, 1997, Coastal Engineering Associates, Inc. (Coastal) was contracted by the Hernando County Department of Public Works (HCDPW) to perform sea grass monitoring and to provide a monitoring report in accordance with provisions for Bayport Channel dredging contained in permits issued by the Florida Department of Environmental Protection (FDEP) (#271422133) and the U.S. Army Corps of Engineers (COE) (#90IPF-03355).

The project site is located in Sections 25 and 36, Township 22 South, Range 16 East, Hernando County, Florida, at the western terminus of CR 550 (Figure 1). The FDEP and COE permits are for a channel extension and maintenance dredging project. The permit conditions in the Sea Grass Monitoring Plan specified that permanent sampling stations be established at four groups of channel markers (5/6, 7/8, 9/10, and 11/12), where the extension has occurred within the Bayport Channel. Two additional transects were established to monitor an existing section of the channel where only maintenance dredging occurred. The general channel area map (Figure 2) locates the positions of the channel marker groups and established vegetative transects used to monitor the channel.

Pre-dredging baseline data on vegetative species and percent coverage for each station was collected by Berryman and Henigar on 15 March 1995. The channel extension was dredged and maintenance was completed in May 1996. The initial post-dredging monitoring report was provided by Coastal in October 1997. Due to turbid conditions from the unusual El Niño weather event, the second post-dredging monitoring report was not completed. This report documents the results from the third post-dredging sea grass monitoring event conducted at the Bayport Channel.

OBJECTIVE

According to permit provisions, the channel is to be monitored for five (5) years following dredging as outlined below; however, the HCDPW can discontinue monitoring sooner than five years after dredging if monitoring in the extension portions of the channel indicates that the percentage of sea grass coverage meets or exceeds the cover percentages prior to dredging.

Standardized quantitative sampling provides objective, reproducible information about the plant community for use in assessing existing conditions, as well as the extent of recruitment during future monitoring events. Qualitative and quantitative monitoring activities summarized in this report were conducted on 7 December 1999, by Environmental Specialist Christopher Gasinski of Biological Research Associates, Ltd.

METHODOLOGY

Field sampling methodologies generally followed the permit criteria recommended in the Sea Grass Monitoring Plan to document the natural recovery of sea grass vegetation within the dredged channel.

As outlined in the 1997 initial data study, six (6) transects were established with three (3) quadrats per channel marker group with two (2) internal quadrats (Q1 and Q2) and one external quadrat (Q3). All Q1 quadrats are located 50 feet south of the northern channel markers and visually estimated to be between the channel markers. All Q2 quadrats are 50 feet north of the southern channel markers and visually estimated to be between the channel markers. The Q3 quadrats are positioned in an alternating pattern either 50 feet

north or south of the six channel group markers outside the channel. The center points of all the quadrats are demarcated by sections of 3/4" PVC pipe embedded approximately 18" into the sea bottom with approximately 6" remaining above grade. These markers will also be used for future monitoring events in conjunction with a 1m² PVC sampling quad.

The composition and percent of cover of the various marine vegetation species present were quantitatively assessed by visually estimating the area covered by individual species and community types of vegetative assemblages in each quadrat. Sea grass shoot densities were counted in three (3) of the 16 subunits of each individual quadrat. The internal transect quads were averaged to estimate the percentage of area coverage and sea grass shoots in the dredged area.

Vegetative Ground/Cover

The area covered by sea grass and algal groundcover species, as well as the bare ground, was visually estimated and recorded at each of the 18 quadrats using the 1m² sampling quad. The internal quadrats (Q1, Q2) were averaged to determine the percent of vegetative cover for each transect as a community (Table 1).

Sea Grass Shoot Density

Vegetative shoot counts were conducted for each of the 18 quadrats using a modified version of the 1m² sampling quad divided into sixteenths by string and then random selection of three one-sixteenth areas within the sampling quad. Sea grass shoot density (number of shoots per 1m²) was calculated by counting and recording the number of sea grass shoots within each area (Table 1). The number of sea grass shoots for the three one-sixteenth areas were averaged (Avg), then multiplied by 16 to estimate the number of sea grass shoots for each 1m² quad (total/m²). Averaging the Q1 and Q2 quads for each transect estimated number of sea grass shoots per 1m² for the internal area of each transect (T Avg/m²).

Water Depth

Water depth and time of the sampling was measured and recorded at each quadrat. Water depths were visually estimated from Mean High Water (MHW) benchmarks at channel marker groups 5/6, 9/10 and 15a/16a. Depth data presented in Table 1 are the adjusted water elevations below the MHW benchmarks.

Photo Documentation

Eighteen photographs were taken with the 1m² sampling quad in place. The photograph for Transect #6 Quad #3 did not develop well and has not been included with this report. The locations of photo stations are in Figure 2.

RESULTS

For this monitoring event, three of the six (6) original external quadrats were re-established and three (3) of the original six (6) stations were recovered. The 12 internal quadrats had to be re-established (based on measurements taken between channel markers) due to the channel extension and maintenance dredging conducted since the baseline study. Dominant sea grass species within the channel monitoring area included *Halodule wrightii* and *Ruppia maritima*. Coastal and BRA believe that during the baseline report by Berryman and Henigar, the sea grasses were misidentified. For the purpose of this report, *Thalassia testudinum* in the baseline report was identified as *Halodule wrightii* and *Halodule wrightii* in the baseline report was identified as *Ruppia maritima*. Dominant algal species present included *Digenia simplex* and *Penicillus capitatus*. The data in Table 1 summarizes information on sea grass shoot densities and percent

cover information for each repetition. Table 1 also provides average percent sea grass coverage of the channel for the internal quadrats in relation to the external quadrats.

Vegetative Groundcover

Collectively, sea grass average area coverage for the internal quads ranged from zero percent to 40 percent and algal species area coverage ranged from zero percent to 10 percent. In comparison, sea grasses in the external quadrats represented one percent to 90 percent coverage and algae represented zero percent to 10 percent coverage across the transects. The T6 transect was vegetatively dominated by *Ruppia maritima*; Transects T1, T4, and T5 were dominated by *Halodule wrightii*. A summary of groundcover is provided in Table 1.

Non-Vegetative Groundcover

Bare ground and algal associations were recognized as an integral part of the Bayport Channel grass beds. The amount of bare ground varied from transect to transect, but the internal quad averages ranged from 60 percent to 100 percent, while external quad averages ranged from zero percent to 99 percent.

Sea Grass Shoot Density

Halodule wrightii represented a dominance in the number of sea grass shoots per 1m². Internal transect averages ranged from 0 to 752 shoots per 1m², while external transect averages ranged from zero to 1,968 shoots/m². Individual transect results are listed on each photo-sheet with complete shoot counts.

SUMMARY / CONCLUSIONS

Data collected for this report occurred in December. The cooler water temperatures of December inhibits the growth of most algal species, therefore fewer algae species were noted during this event. All transects contained either *Halodule w.* or *Ruppia m.* with concentrations from as high as 95 percent to as low as 1 percent. Sea grass coverage increased throughout T1 and within T4-Q3 and T6-Q3. All the Quadrats within T-2 and T-3 as well as the internal quadrats of T-4 and T-6 showed a decrease in sea grass coverage when compared to the baseline data. Transect #2 had high concentrations of shell substrate, which may have had an impact on the rate at which sea grass establishes itself within this transect. Continued monitoring events will be useful in determining any trends in the diversity of conditions or coverages. The next monitoring event is scheduled for September 2000.

DATA SHEET

Table 1.0 Percent Coverage

STRATUM	T1 CHAN 5/6			T2 CHAN 7/8			T3 CHAN 9/10			T4 CHAN 11/12			T5 CHAN 15a/16a			T6 CHAN 21/22		
	Q1	Q2	Q3s	Q1	Q2	Q3s	Q1	Q2	Q3s	Q1	Q2	Q3s	Q1	Q2	Q3s	Q1	Q2	Q3s
<i>Ruppia maritima</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Halodule wrightii</i>	20%	35%	60%	—	—	1%	<1%	<1%	25%	2%	4%	95%	1%	<1%	50%	—	—	—
Alga	2%	5%	5%	—	10%	—	—	—	5%	—	—	5%	5%	—	—	—	—	—
Bare Ground	78%	60%	35%	100%	90%	99%	>99%	>99%	70%	98%	96%	0%	94%	>99%	49%	—	—	—
Water Depth	5'	5'	5'	5'	5'	3'	5.5'	5.5'	3'	5.5'	5.5'	2'	5'	5'	2'	4.5'	4"	—
Photo #	8	7	6	9	10	5	12	11	4	14	13	3	15	16	2	17	18	1
Photo Direction	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Water Surface Elev. (MHW)			-2.5'				-2'	-2'	-3'	-1.75'			-1.5'			-1.5'		
Time	11:15	11:05	10:48			10:32	11:56	11:44		12:17	12:11	10:00		12:42	9:44			9:21
Tide Direction						IN	IN	IN		IN	IN	IN		IN	IN	IN	IN	OUT

SHOOT DENSITY	T1 CHAN 5/6			T2 CHAN 7/8			T3 CHAN 9/10			T4 CHAN 11/12			T5 CHAN 15a/16a			T6 CHAN 21/22				
	S4	S6	S13	S4	S6	S13	S4	S6	S13	S4	S6	S13	S4	S6	S13	S4	S6	S13	Avg	
Q1	9	8	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	
total/m ²	123			0			48			117			16			144			9	
Q2	15	13	19	16	—	—	—	0	1	4	2	2	9	14	2	8	4	7	3	5
total/m ²	251			0			37			133			75			128			8	
Q3	14	20	19	18	5	3	5	4	Q8	12	14	11	37	42	44	41	17	42	32	30
total/m ²	283			69			181			656			485			453			28	
T Avg/m ²	3,499			370			1,422			4,836			3,072			3,868				

MHW = Mean High Water

H = *Halodule wrightii*

R = *Ruppia maritima*

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D.E.F.
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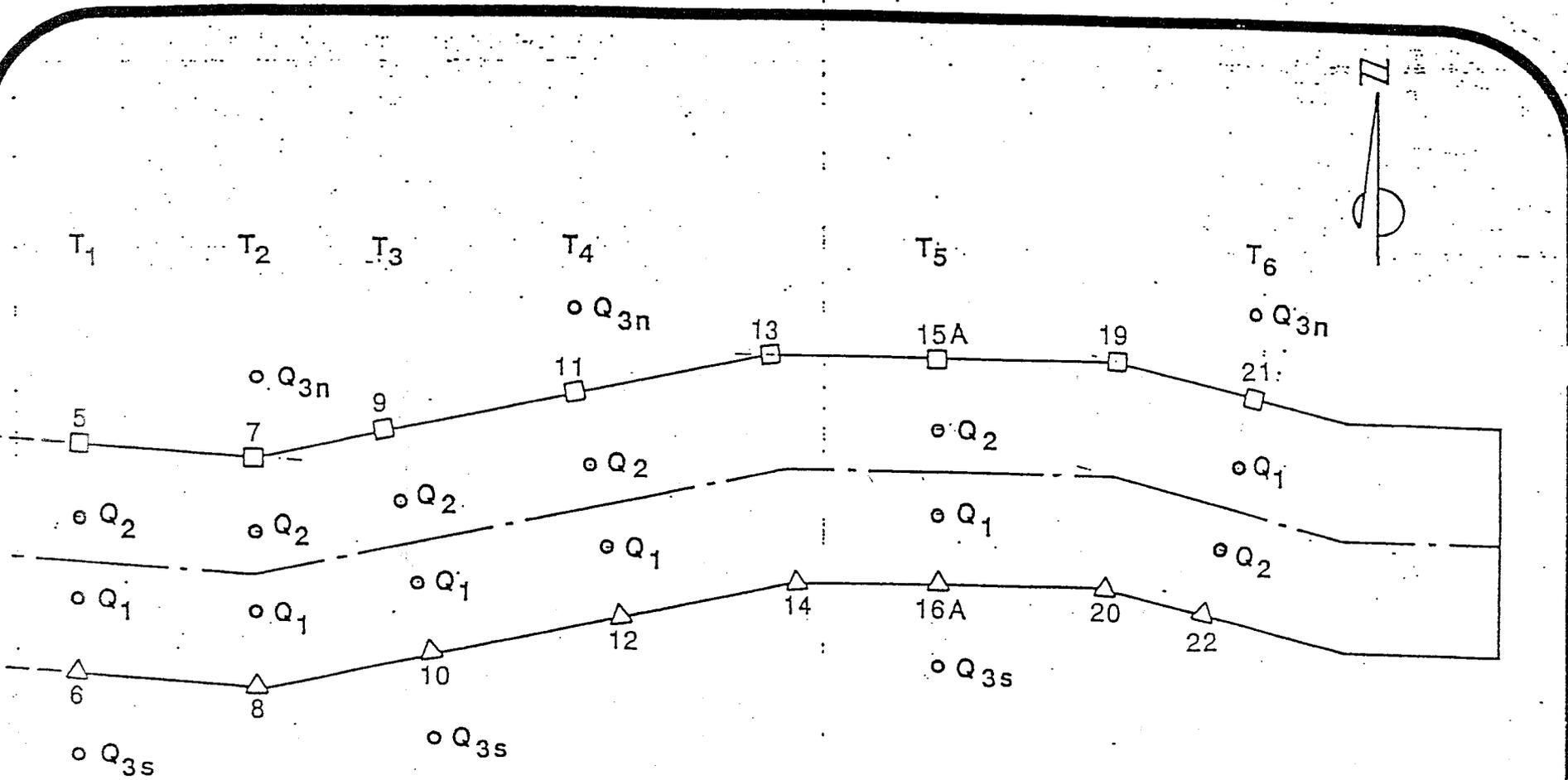


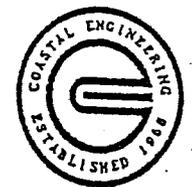
FIGURE 2

Bayport Channel Transects

, October, 1997

LEGEND

- T₁ TRANSECT NO.
- Q₁ QUADRAT NO. (photostation)
- 5 □ 6 △ CHANNEL MARKER & NO.



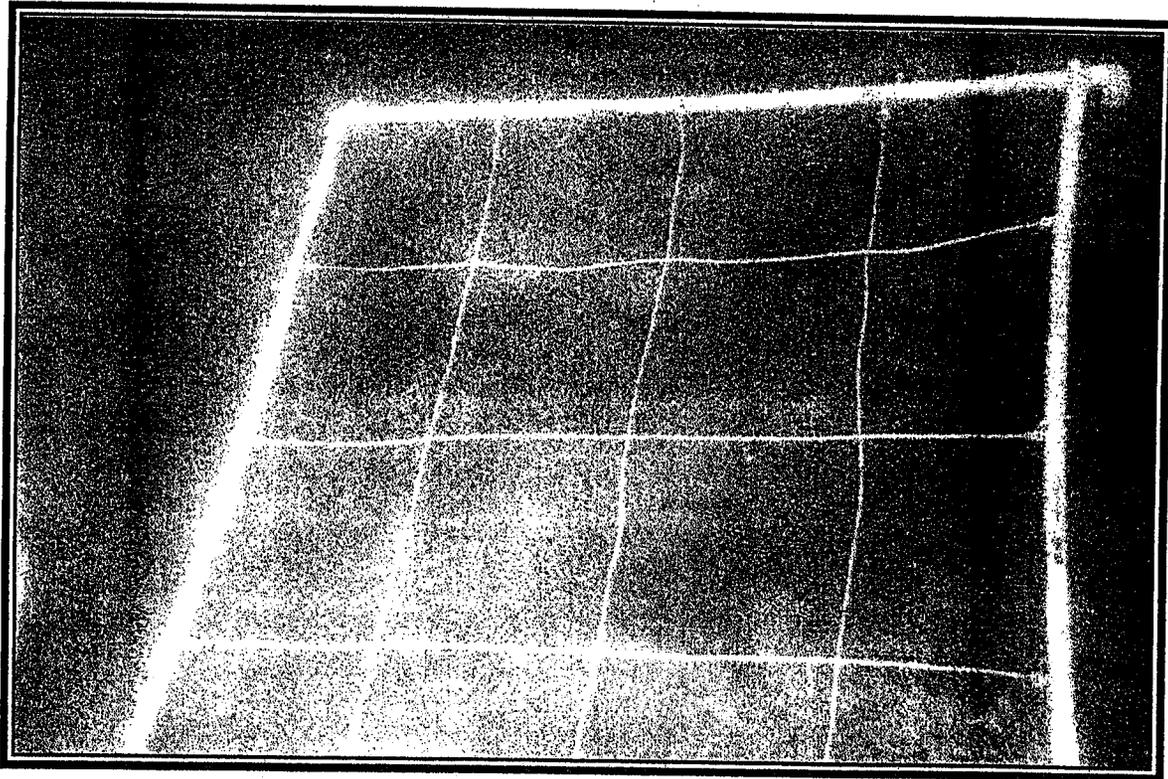
PREPARED BY
 COASTAL ENGINEERING ASSOCIATES, INC.
 BROOKSVILLE, FLORIDA

CEA Project No. 97222-2

TRANSECT #1 (CHAN 5/6)
QUADRAT 1

SHOOT DENSITY	S4	S6	S13	Ave
Q1	9	8	6	23
total/m ²	368			

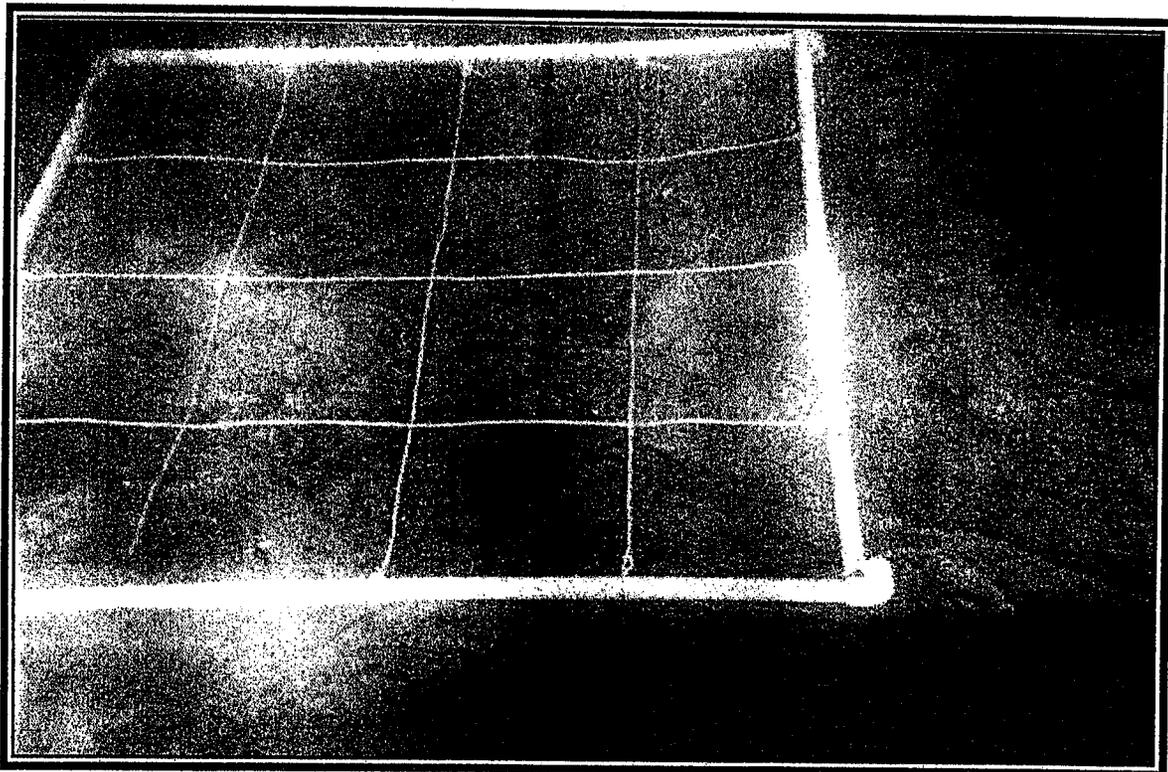
REPETITIONS	
STRATUM	Q1
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	20%
Alga	2%
Bare Ground	78%
Water Depth	5'
Photo #	8
Photo Direction	N
Total % Cover (vegetation)	22%



TRANSECT #1 (CHAN 5/6)
 QUADRAT 2

SHOOT DENSITY	S4	S6	S13	Ave
Q2	15	13	19	47
total/m ²	752			

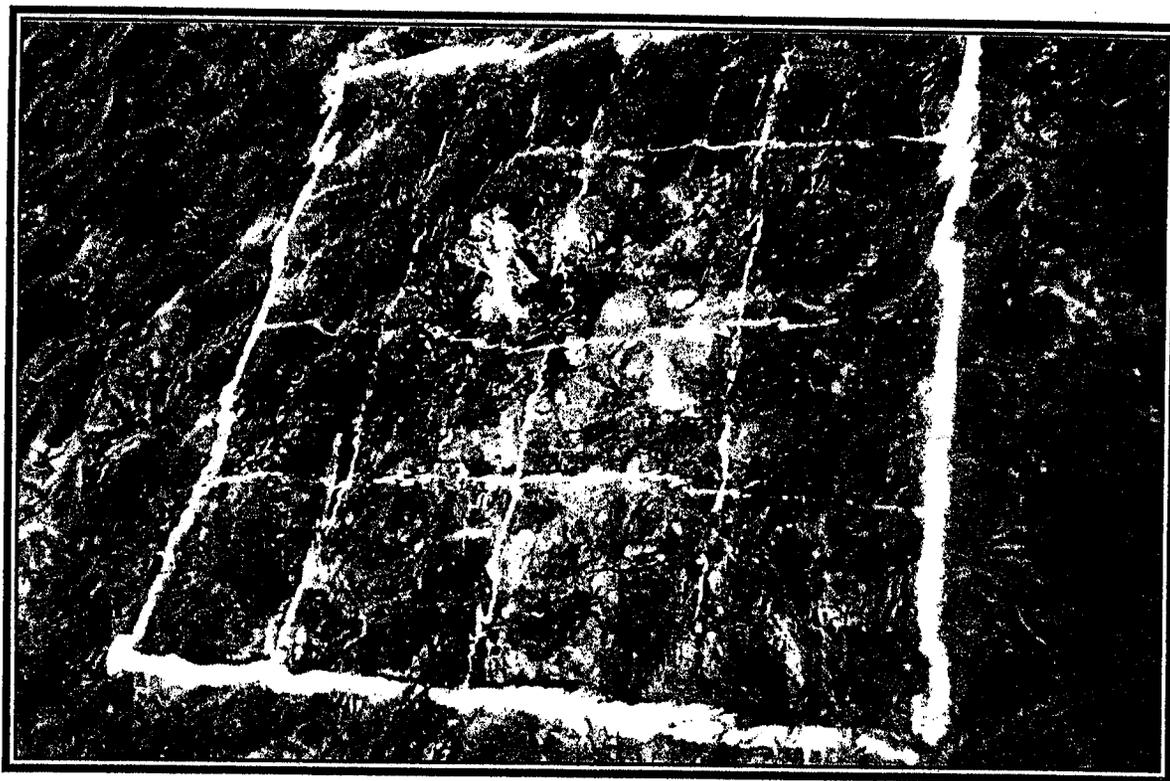
REPETITIONS	
STRATUM	Q2
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	35%
Alga	5%
Bare Ground	60%
Water Depth	5'
Photo #	7
Photo Direction	N
Total % Cover (vegetation)	40%



TRANSECT #1 (CHAN 5/6)
 QUADRAT 3

SHOOT DENSITY	S4	S6	S13	Ave
Q3	14	20	19	53
total/m ²	848			

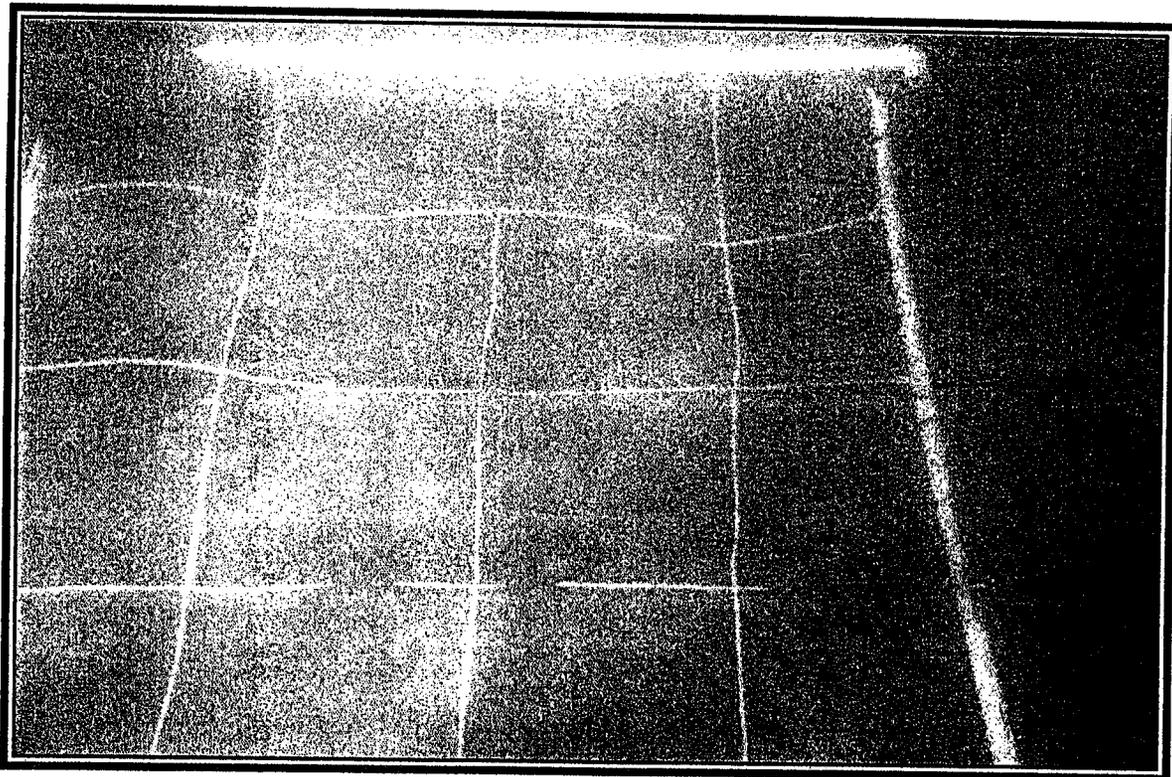
REPETITIONS	
STRATUM	Q3s
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	60%
Alga	5%
Bare Ground	35%
Water Depth	5'
Photo #	6
Photo Direction	N
Total % Cover (vegetation)	65%



**TRANSECT #2 (CHAN 7/8)
QUADRAT 1**

SHOOT DENSITY	S4	S6	S13	Ave
Q1	0	0	0	0
total/m ²	0			

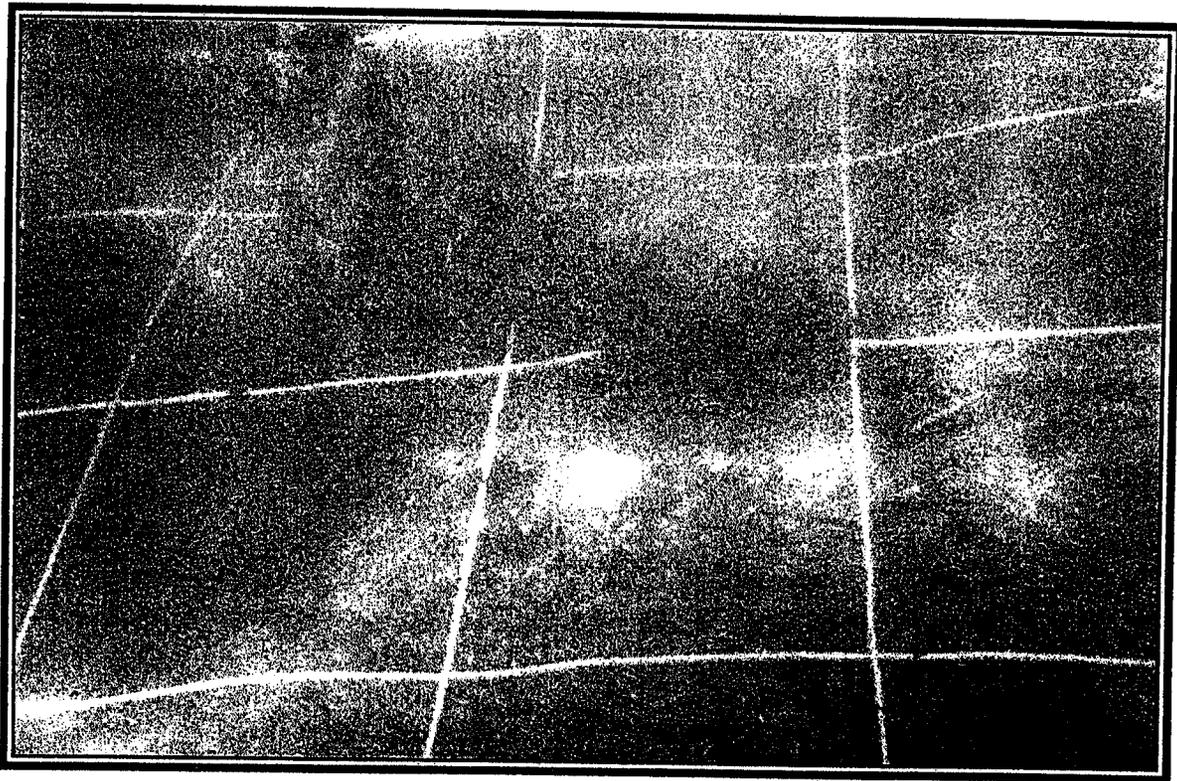
REPETITIONS	
STRATUM	Q1
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	—
Alga	—
Bare Ground	100%
Water Depth	5'
Photo #	9
Photo Direction	N
Total % Cover (vegetation)	0%



TRANSECT #2 (CHAN 7/8)
 QUADRAT 2

SHOOT DENSITY	S4	S6	S13	Ave
Q2	0	0	0	0
total/m ²	0			

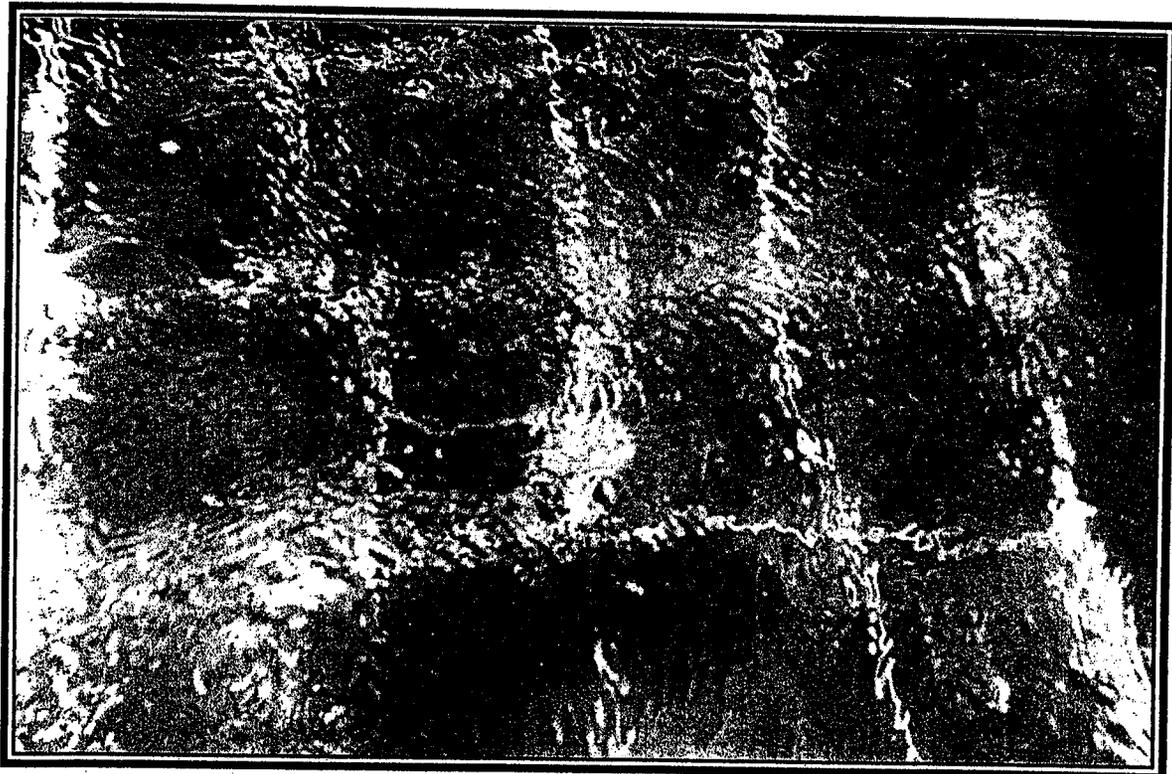
REPETITIONS	
STRATUM	Q2
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	—
Alga	10%
Bare Ground	90%
Water Depth	5'
Photo #	10
Photo Direction	N
Total % Cover (vegetation)	10%



TRANSECT #2 (CHAN 7/8)
 QUADRAT 3

SHOOT DENSITY	S4	S6	S13	Ave
Q3	5	3	5	13
total/m ²	208			

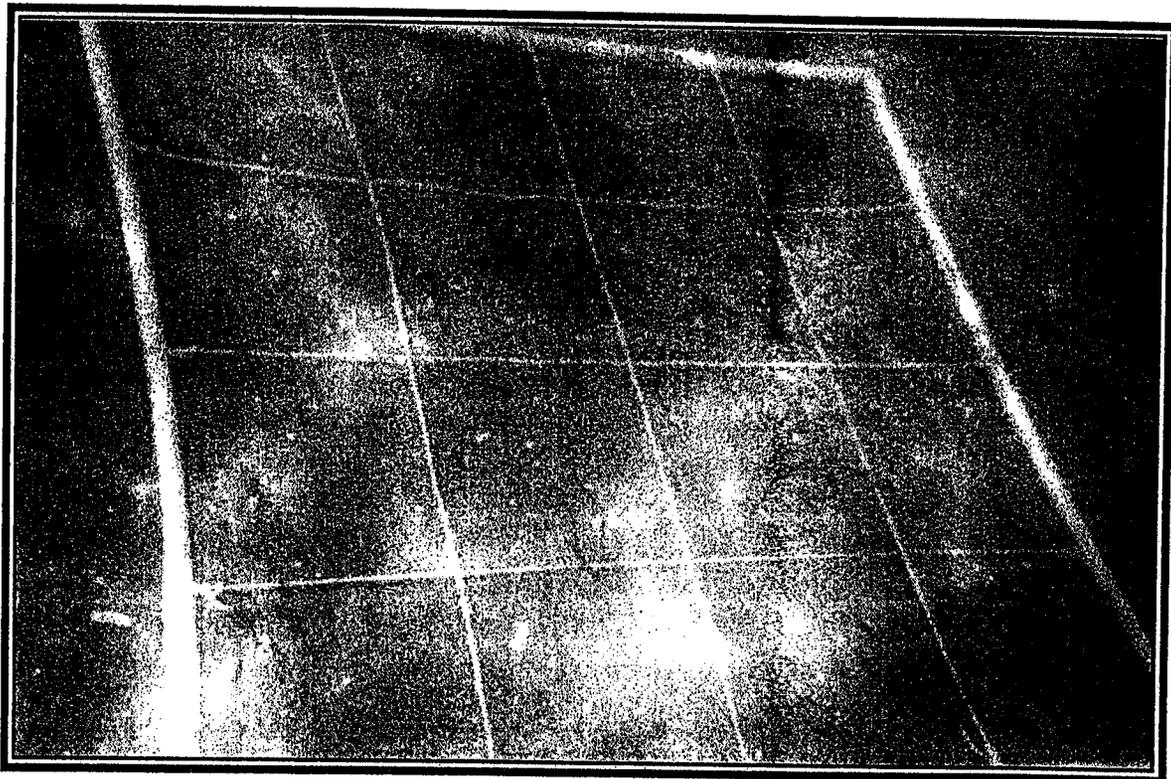
REPETITIONS	
STRATUM	Q3n
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	1%
Alga	—
Bare Ground	99%
Water Depth	3'
Photo #	5
Photo Direction	N
Total % Cover (vegetation)	1%



TRANSECT #3 (CHAN 9/10)
 QUADRAT 1

SHOOT DENSITY	S4	S6	S13	Ave
Q1	4	2	0	6
total/m ²	96			

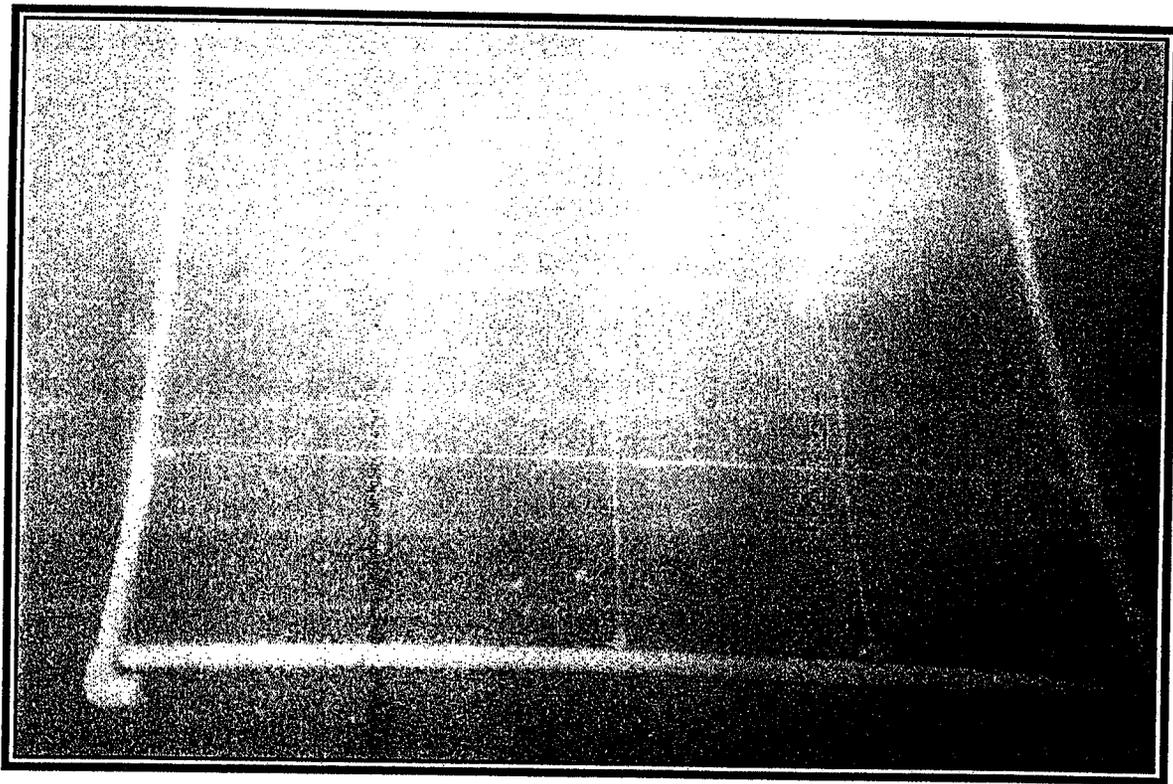
REPETITIONS	
STRATUM	Q1
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	<1%
Alga	—
Bare Ground	>99%
Water Depth	5.5'
Photo #	12
Photo Direction	N
Total % Cover (vegetation)	1%



**TRANSECT #3 (CHAN 9/10)
QUADRAT 2**

SHOOT DENSITY	S4	S6	S13	Ave
Q2	1	4	2	7
total/m ²	112			

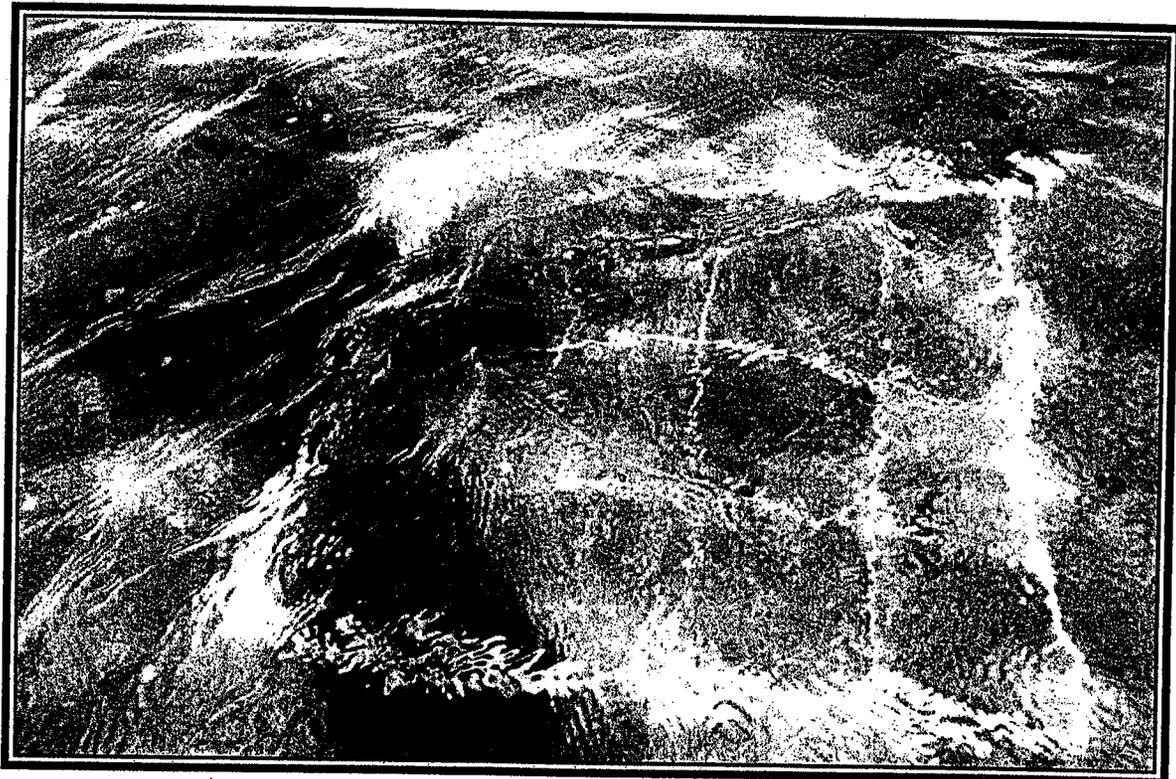
REPETITIONS	
STRATUM	Q2
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	<1%
Alga	—
Bare Ground	>99%
Water Depth	5.5'
Photo #	11
Photo Direction	N
Total % Cover (vegetation)	1%



TRANSECT #3 (CHAN 9/10)
 QUADRAT 3

SHOOT DENSITY	S4	S6	S13	Ave
Q3	18	12	14	44
total/m ²	704			

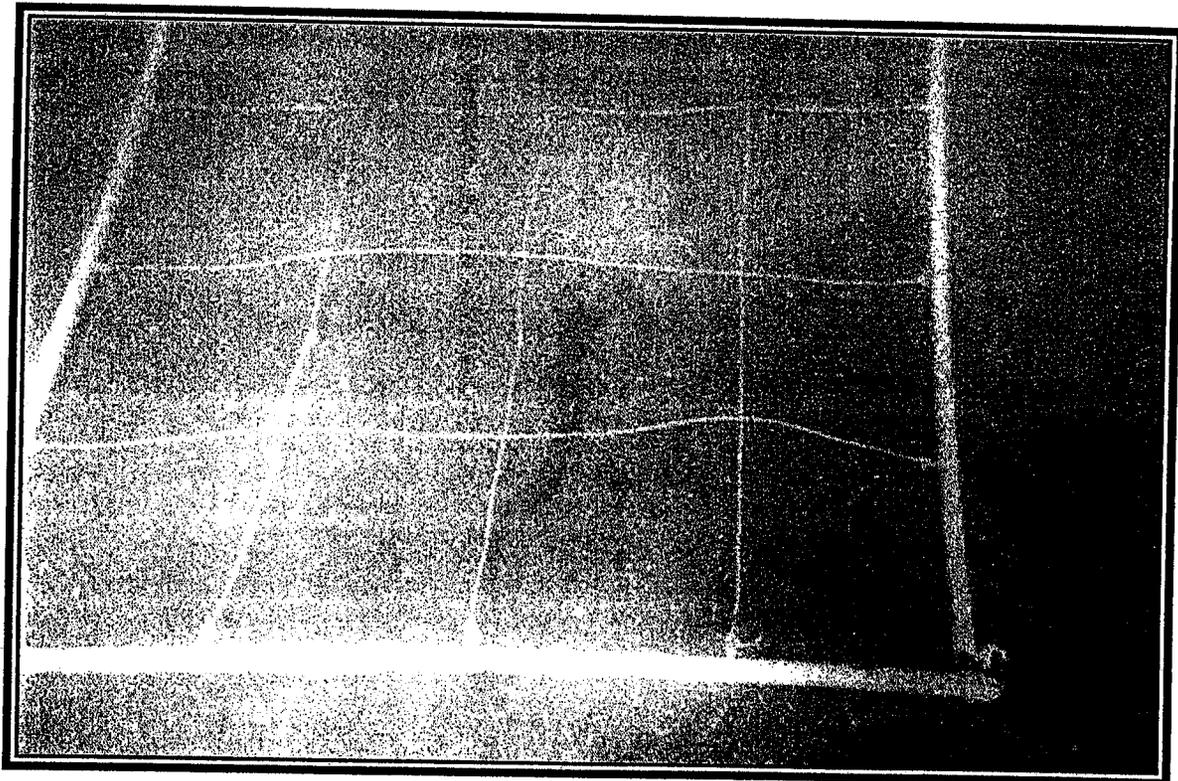
REPETITIONS	
STRATUM	Q3s
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	25%
Alga	5%
Bare Ground	70%
Water Depth	3'
Photo #	4
Photo Direction	N
Total % Cover (vegetation)	30%



TRANSECT #4 (CHAN 11/12)
 QUADRAT 1

SHOOT DENSITY	S4	S6	S13	Ave
Q1	8	10	4	22
total/m ²	352			

REPETITIONS	
STRATUM	Q1
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	2%
Alga	—
Bare Ground	98%
Water Depth	5.5'
Photo #	14
Photo Direction	N
Total % Cover (vegetation)	2%



**TRANSECT #4 (CHAN 11/12)
QUADRAT 2**

SHOOT DENSITY	S4	S6	S13	Ave
Q2	9	14	2	25
total/m ²	400			

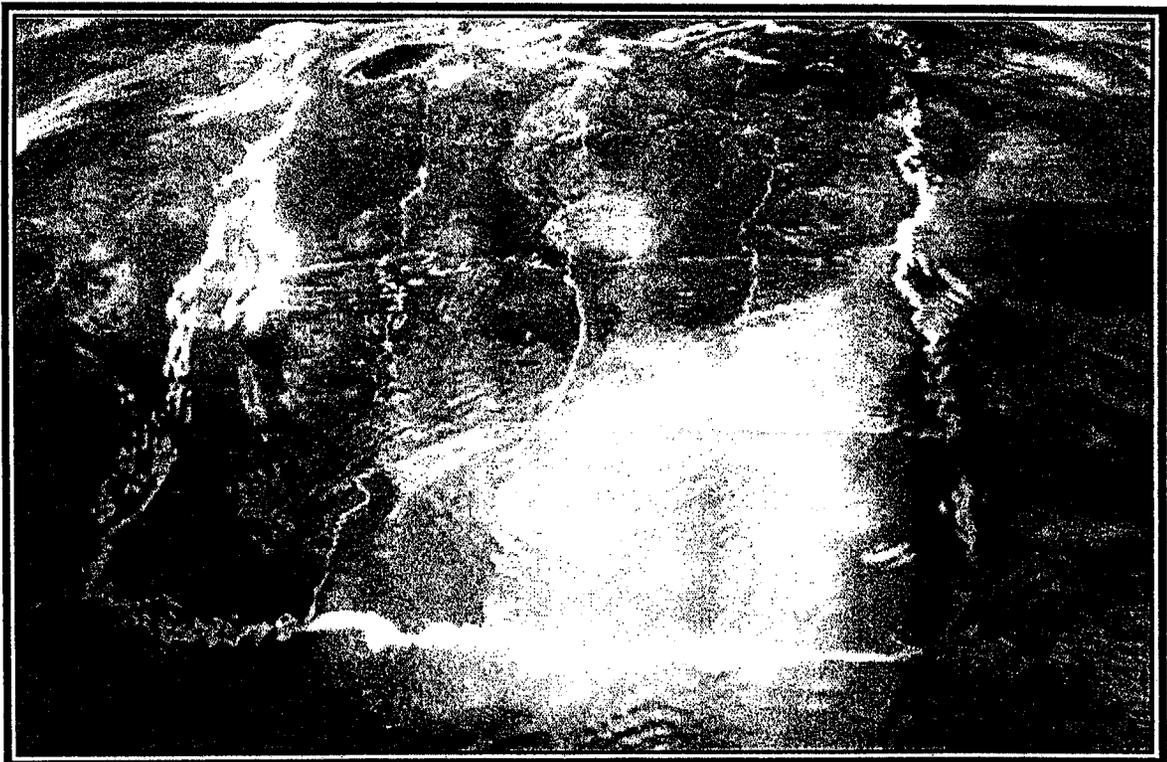
REPETITIONS	
STRATUM	Q2
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	4%
Alga	—
Bare Ground	96%
Water Depth	5.5'
Photo #	13
Photo Direction	N
Total % Cover (vegetation)	4%



**TRANSECT #4 (CHAN 11/12)
QUADRAT 3**

SHOOT DENSITY	S4	S6	S13	Ave
Q3	37	42	44	123
total/m ²	1968			

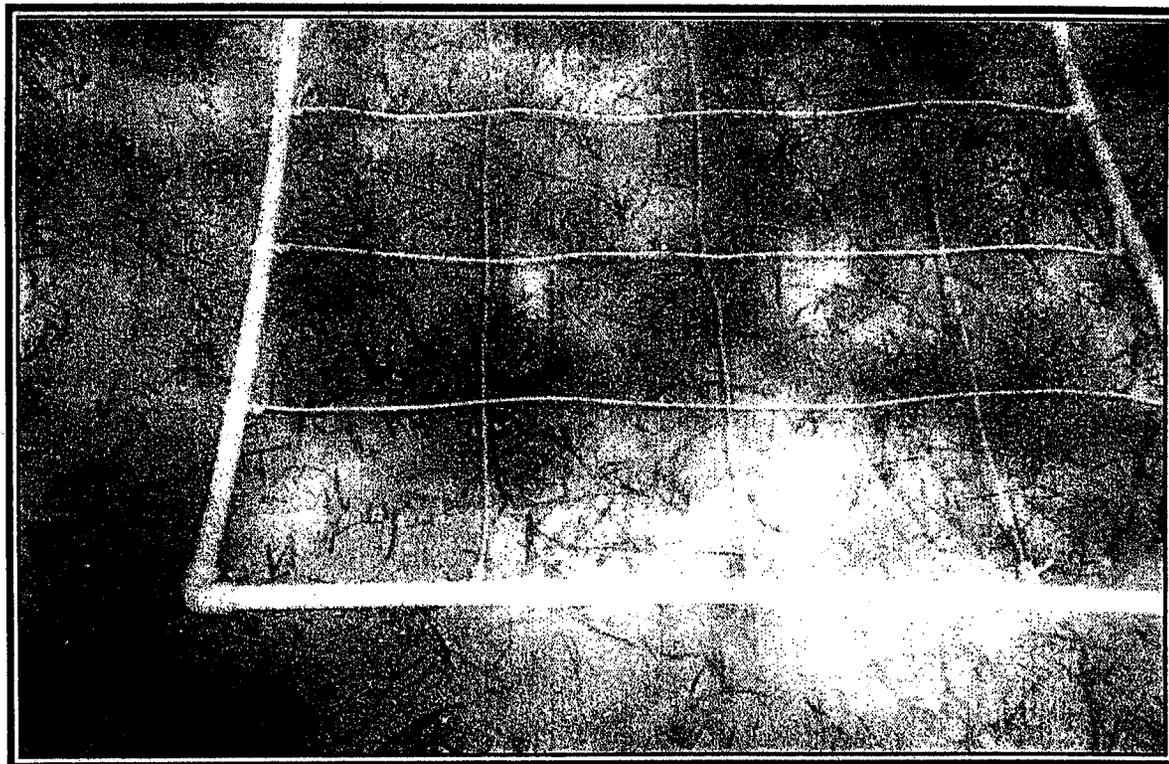
REPETITIONS	
STRATUM	Q3s
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	95%
Alga	5%
Bare Ground	0%
Water Depth	2'
Photo #	3
Photo Direction	N
Total % Cover (vegetation)	100%



TRANSECT #5 (CHAN 15a/16a)
QUADRAT 1

SHOOT DENSITY	S4	S6	S13	Ave
Q1	1	0	0	1
total/m ²	16			

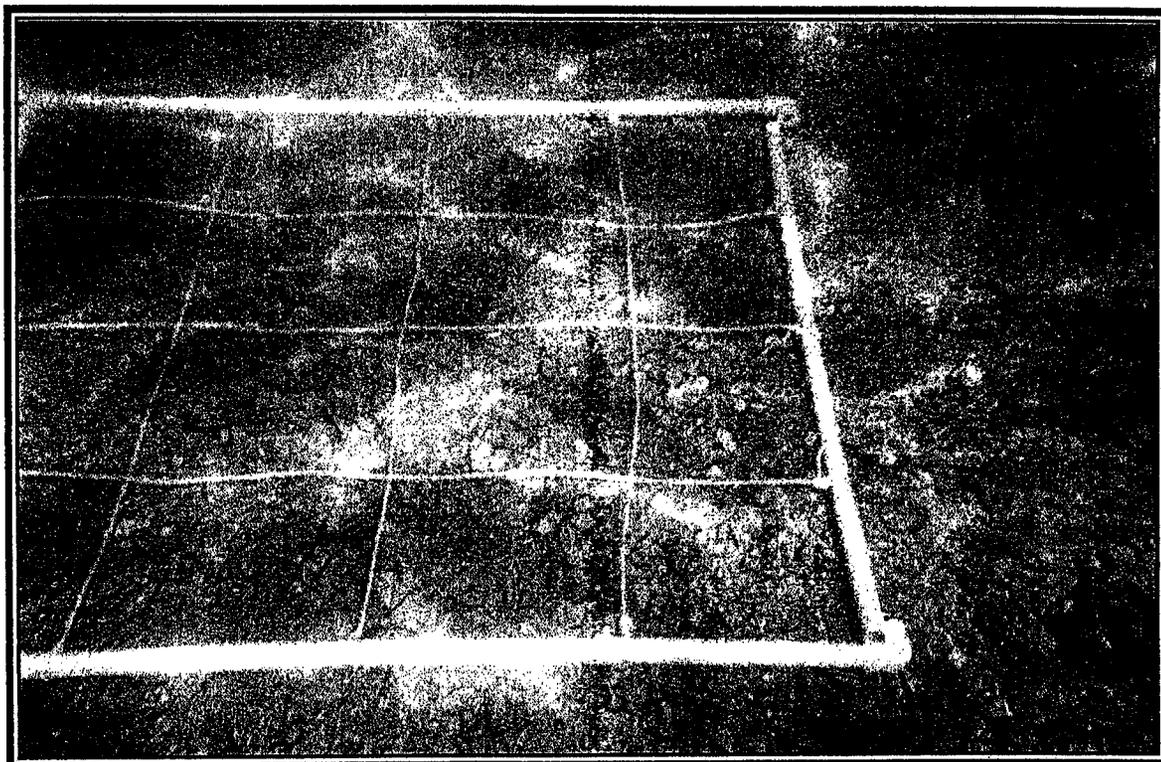
REPETITIONS	
STRATUM	Q1
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	1%
Alga	5%
Bare Ground	94%
Water Depth	5'
Photo #	15
Photo Direction	N
Total % Cover (vegetation)	6%



TRANSECT #5 (CHAN 15a/16a)
 QUADRAT 2

SHOOT DENSITY	S4	S6	S13	Ave
Q2	4	7	3	14
total/m ²	224			

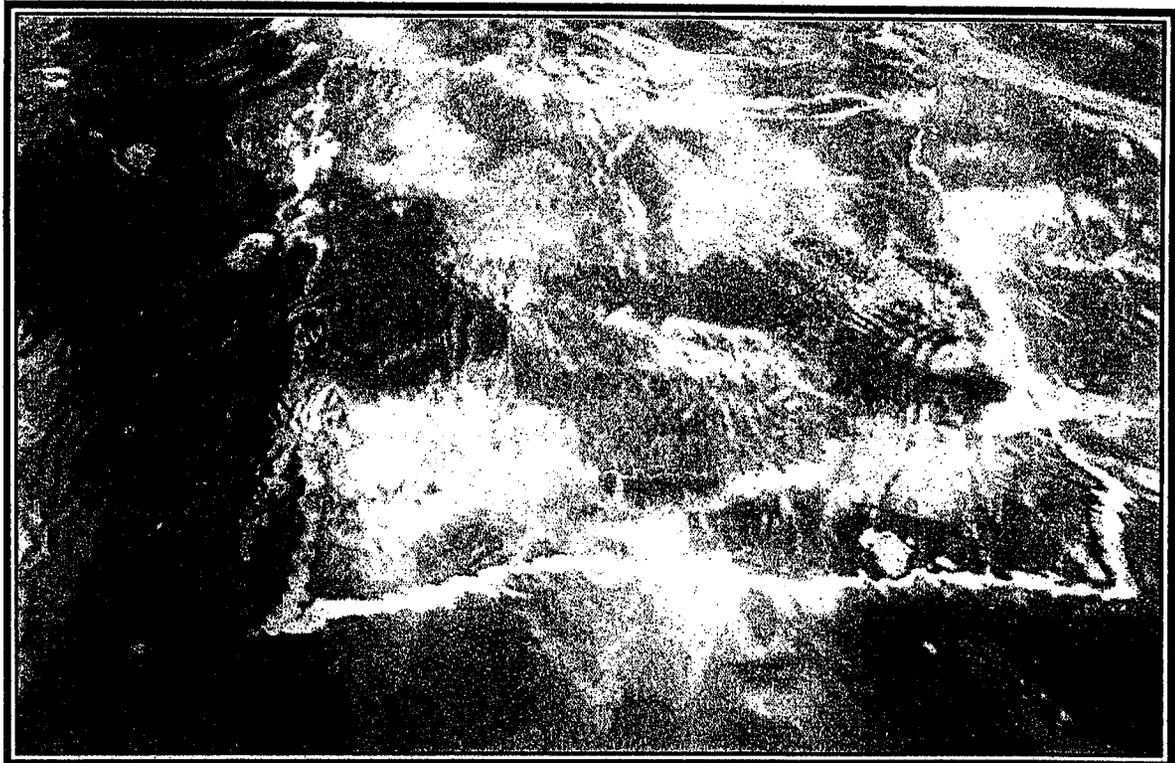
REPETITIONS	
STRATUM	Q2
<i>Ruppia maritima</i>	—
<i>Halodule wrightii</i>	<1%
Alga	—
Bare Ground	>99%
Water Depth	5'
Photo #	16
Photo Direction	N
Total % Cover (vegetation)	1%



**TRANSECT #5 (CHAN 15a/16a)
QUADRAT 3**

SHOOT DENSITY	S4	S6	S13	Ave
Q3	17	42	32	91
total/m ²	1456			

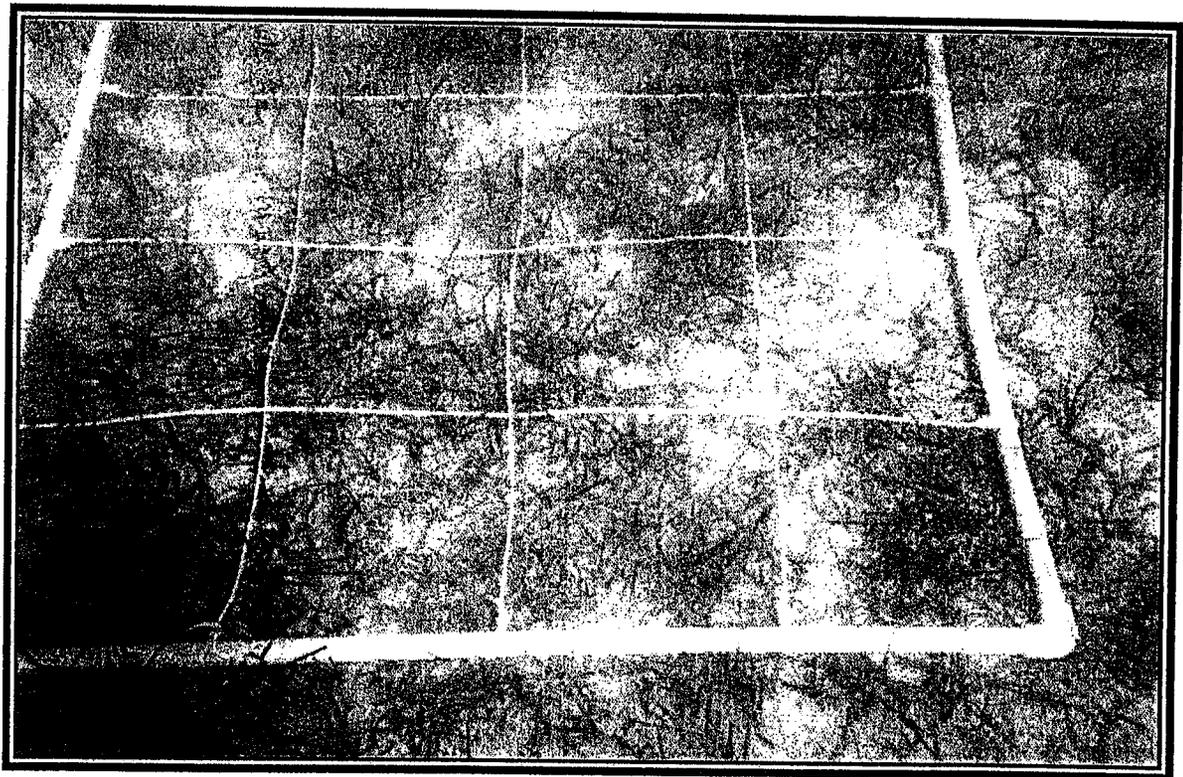
REPETITIONS	
STRATUM	Q3n
<i>Ruppia maritima</i>	1%
<i>Halodule wrightii</i>	50%
Alga	—
Bare Ground	49%
Water Depth	2'
Photo #	2
Photo Direction	SW
Total % Cover (vegetation)	51%



**TRANSECT #6 (CHAN 21/22)
QUADRAT 1**

SHOOT DENSITY	S4	S6	S13	Ave
Q1	7	10	10	27
total/m ²	432			

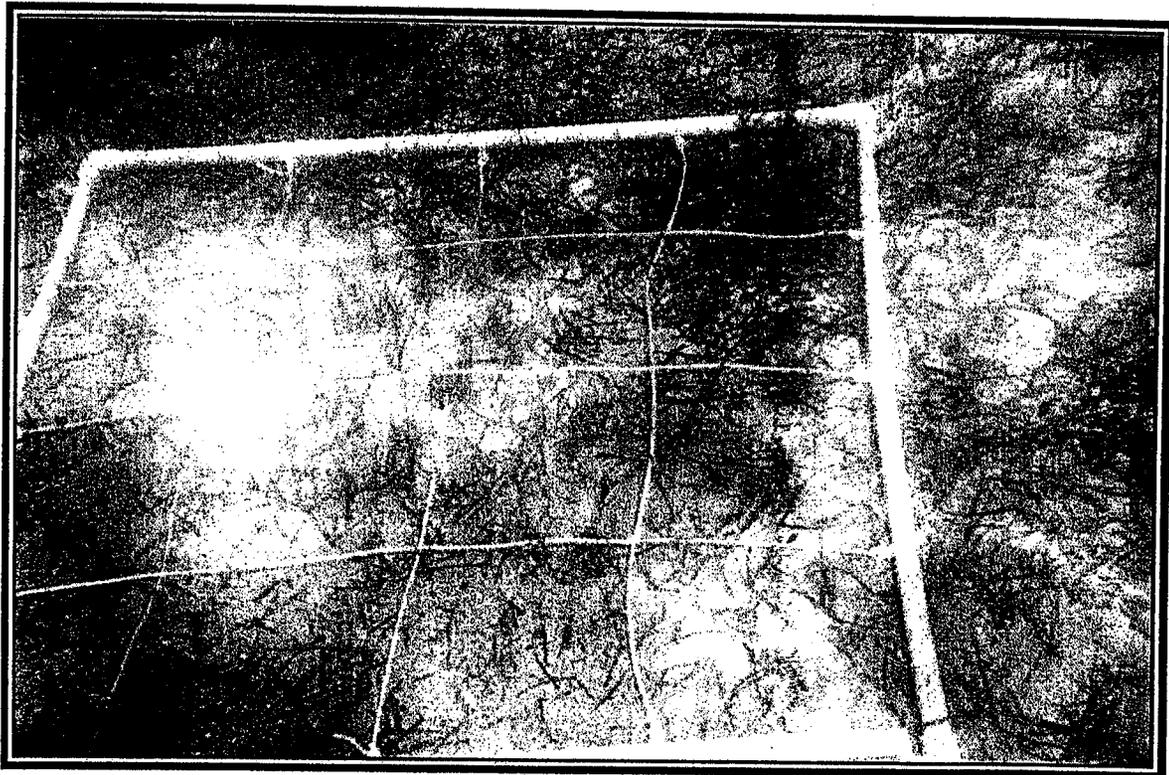
REPETITIONS	
STRATUM	Q1
<i>Ruppia maritima</i>	5%
<i>Halodule wrightii</i>	—
Alga	—
Bare Ground	95%
Water Depth	5'
Photo #	17
Photo Direction	N
Total % Cover (vegetation)	5%



TRANSECT #6 (CHAN 21/22)
 QUADRAT 2

SHOOT DENSITY	S4	S6	S13	Ave
Q2	14	3	7	24
total/m ²	384			

REPETITIONS	
STRATUM	Q2
<i>Ruppia maritima</i>	5%
<i>Halodule wrightii</i>	—
Alga	—
Bare Ground	95%
Water Depth	4.5'
Photo #	18
Photo Direction	N
Total % Cover (vegetation)	5%



**TRANSECT #6 (CHAN 21/22)
QUADRAT 3**

SHOOT DENSITY	S4	S6	S13	Ave
Q3	42	11	32	85
total/m ²	1360			

REPETITIONS	
STRATUM	Q3n
<i>Ruppia maritima</i>	90%
<i>Halodule wrightii</i>	—
Alga	—
Bare Ground	10%
Water Depth	4"
Photo #	1
Photo Direction	SW
Total % Cover (vegetation)	90%

PHOTO OVER EXPOSED