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February 16, 2006

BY HAND

Hon. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Re: Broadwater Energy LLC, Docket No. CP06-54-00

Dear Ms. Salas:

On January 30, 2006, Broadwater Energy LLC submitted for filing an Application for Authority to Site, Construct and Operate LNG Import Terminal Facilities. By this filing, Broadwater Energy hereby submits a supplement to Resource Report Nos. 2 and 3 related to the Offshore Facilities, in response to FERC Staff's January 18, 2006 Environmental Information Request. In addition, modified figures for the Onshore Facilities Resource Reports also are submitted to incorporate marine facilities that were inadvertently omitted from the January 30 filing. A draft notice of filing is included in this filing in hard copy and on a diskette.

Please feel free to contact us if you have any questions regarding this submission.

Respectfully submitted,

Rebecca J. Michael

Bruce W. Neely
Rebecca J. Michael
Attorneys for Broadwater Energy LLC

Enclosure
cc: Mr. James Martin

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Broadwater Energy LLC) Docket No. CP06-54-00

NOTICE OF FILING
(____)

Take notice that on February 15, 2006, Broadwater Energy LLC submitted a Supplemental Filing to its January 30 Application filed in the captioned proceeding. In the Supplemental Filing, Broadwater Energy provides additional information related to Resource Report Nos. 2 and 3 for the Offshore Facilities and modified figures for the Onshore Facilities Resource Reports.

The supplements to Resource Reports 2 and 3 related to the Offshore Facilities are filed in response to FERC Staff's January 18, 2006 Environmental Information Request. In addition, modified figures for the Onshore Facilities Resource Reports also are submitted to incorporate marine facilities that were inadvertently omitted from the January 30 filing.

Any initial questions regarding this filing should be directed to Brian D. O'Neill or Bruce W. Neely, LeBoeuf, Lamb, Greene & MacRae LLP Telephone: (202) 986-8000.

This filing is on file with the Commission and open to public inspection. This filing is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's website at http://www.ferc.gov using the "eLibrary" link. Enter the docket number excluding the last three digits in the docket number field to access the document. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at (866)208-3676, or for TTY, contact (202) 502-8659. There is an "eSubscription" link on the web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s).

There are two ways to become involved in the Commission's review of this project. First, any person wishing to obtain legal status by becoming a party to the proceedings for this project should, on or before the below listed comment date, file with the Federal Energy Regulatory Commission, 888 First Street, NE, Washington, D.C. 20426, a motion to intervene in accordance with the requirements of the Commission's Rules of Practice and Procedure (18 CFR 385.214 or 385.211) and the Regulations under the NGA (18 CFR 157.10). A person obtaining party status will be placed on the service list maintained by the Secretary of the Commission and will receive copies of all documents filed by the applicant and by all other parties. A party must submit an original and 14 copies of filings made with the Commission and must mail a copy to the applicant and to every other party in the proceeding. Only parties to the proceeding can ask for court review of Commission orders in the proceeding.

However, a person does not have to intervene in order to have comments considered. The second way to participate is by filing with the Secretary of the Commission, as soon as possible, an original and two copies of comments in support of or in opposition to this project. The Commission will consider these comments in determining the appropriate action to be taken, but the filing of a comment alone will not serve to make the filer a party to the proceeding. The Commission's rules require that persons filing comments in opposition to the project provide copies of their protests only to the party or parties directly involved in the protest.

Persons who wish to comment only on the environmental review of this project should submit an original and two copies of their comments to the Secretary of the Commission. Those providing environmental comments will be placed on the Commission's environmental mailing list, will receive copies of the environmental documents, and will be notified of meetings associated with the Commission's environmental review process. The environmental commenters will not be required to serve copies of filed documents on all other parties. However, the non-party commenters will not receive copies of all documents filed by other parties or issued by the Commission (except for the mailing of environmental documents issued by the Commission) and will not have the right to seek court review of the Commission's final order.

Motions to intervene, protests and comments may be filed electronically via the internet in lieu of paper; *see* 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site under the "eFiling" link at http://www.ferc.gov. The Commission strongly encourages electronic filings. On or before the comment date, it is not necessary to serve motions to intervene or protests on persons other than the Applicant.

Comment Date: ________________

Magalie Roman Salas
Secretary

VERIFICATION

Rebecca J. Michael being first duly sworn, states, in accordance with Rule 2011(c)(5) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.2011(c)(5) (2005), that she is Counsel to Broadwater Energy LLC; and that she is authorized to execute this Affidavit; that she has read the above and foregoing Supplemental Filing and is familiar with the contents thereof; that, to the best of her information, knowledge and belief, the contents as stated in the paper copies and the electronic medium are true and correct; and that the paper copies of this filing contain the same information as the electronic medium.

Rebecca J. Michael
Counsel to Broadwater Energy LLC

Subscribed and sworn to before me the 16th day of February 2006.

Notary Public

My Commission Expires:

Donna Mercer-Jones
Notary Public, District of Columbia
My Commission Expires September 30, 2009

BROADWATER

SUPPLEMENTAL FILING

FOR A

PROJECT TO CONSTRUCT AND OPERATE A

LIQUEFIED NATURAL GAS RECEIVING TERMINAL

IN

LONG ISLAND SOUND

LONG ISLAND, NEW YORK

UNITED STATES OF AMERICA

FEBRUARY 2006

BROADWATER ENERGY LLC
Docket No. CP06-54-00

PUBLIC

Table of Contents

Part 1

Response to January 18, 2006, Environmental Information Request, Resource Report No. 2, Question e

e. **Provide a tabular summary of the data output for the water quality/sedimentation modeling over time and space including the maximum turbidity under each scenario as an absolute value. Provide tabular data for all resulting values from all three depths (surface, middle, and bottom). In addition, provide literature references for the settling rate and porosity used in the model.**

Appendix E of Resource Report 2 presented the results of the water quality/sediment quality modeling conducted for the Broadwater Project. For the first 12 hours of plowing operations (Timesteps 24 to 36), plots were presented in 2-hour increments. Subsequent to that, anticipated total suspended solids (TSS) levels were presented in 50-hour increments to provide representative depictions of modeling results between Timesteps 50 to 250. Additional plots were also included for the completion of construction (Timestep = 272) and 12 hours after construction (Timestep = 284). FERC requested additional modeling results to better evaluate the persistence of the TSS during the course of construction. To this end, Broadwater prepared additional figures to present the modeling results at shorter time intervals. Modeling results are provided for Timesteps 50 to 300, with plots for the surface, mid-depth, and bottom provided at 10-hour increments. As with the original modeling results, to make comparisons between plots easier, one standard scale was used throughout the report. Where TSS values exceeded the scale maximum of 14 mg/L, the figures were replotted with an expanded TSS scale that ranged up to 160 mg/L, zoomed in on the higher values. Only a single mid-depth plot (Timestep = 160) required additional mapping at the higher scale, while eight of the bottom plots required additional refinement.

The expanded scale for the mid-depth plot at Timestep = 160 shows that TSS levels do not exceed 20 mg/L and are of short-term duration. The expanded plots for the bottom TSS levels show three short duration spikes of elevated sediment load at Timesteps 90, 140, and 170. Evaluation of the adjacent timesteps for each of these specific timesteps demonstrates that the TSS spikes are of short-term duration, with the elevated TSS levels persisting for less than 24 hours in all cases.

List of Figures

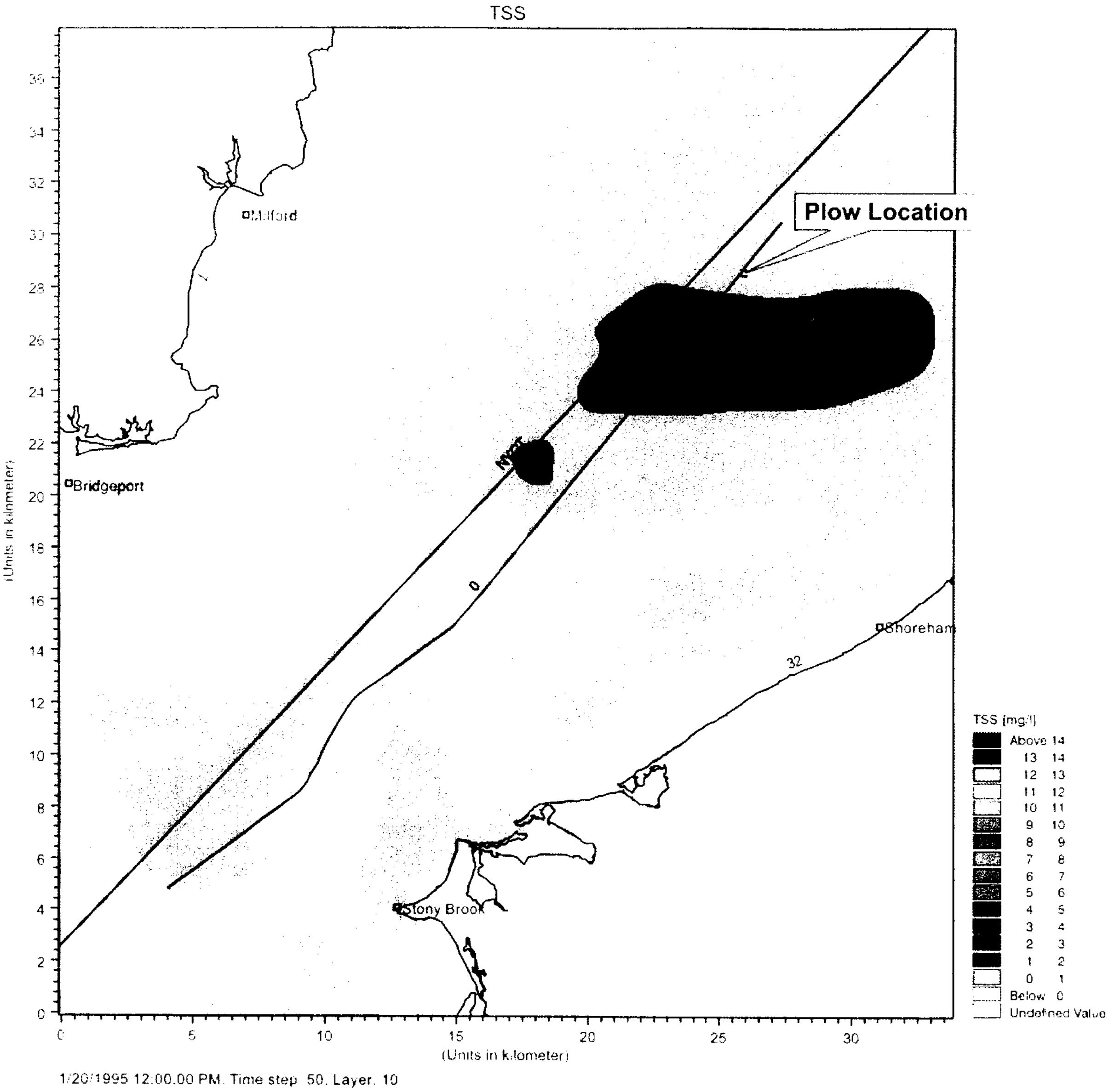

Figure 1 **Surface at Timestep = 50**

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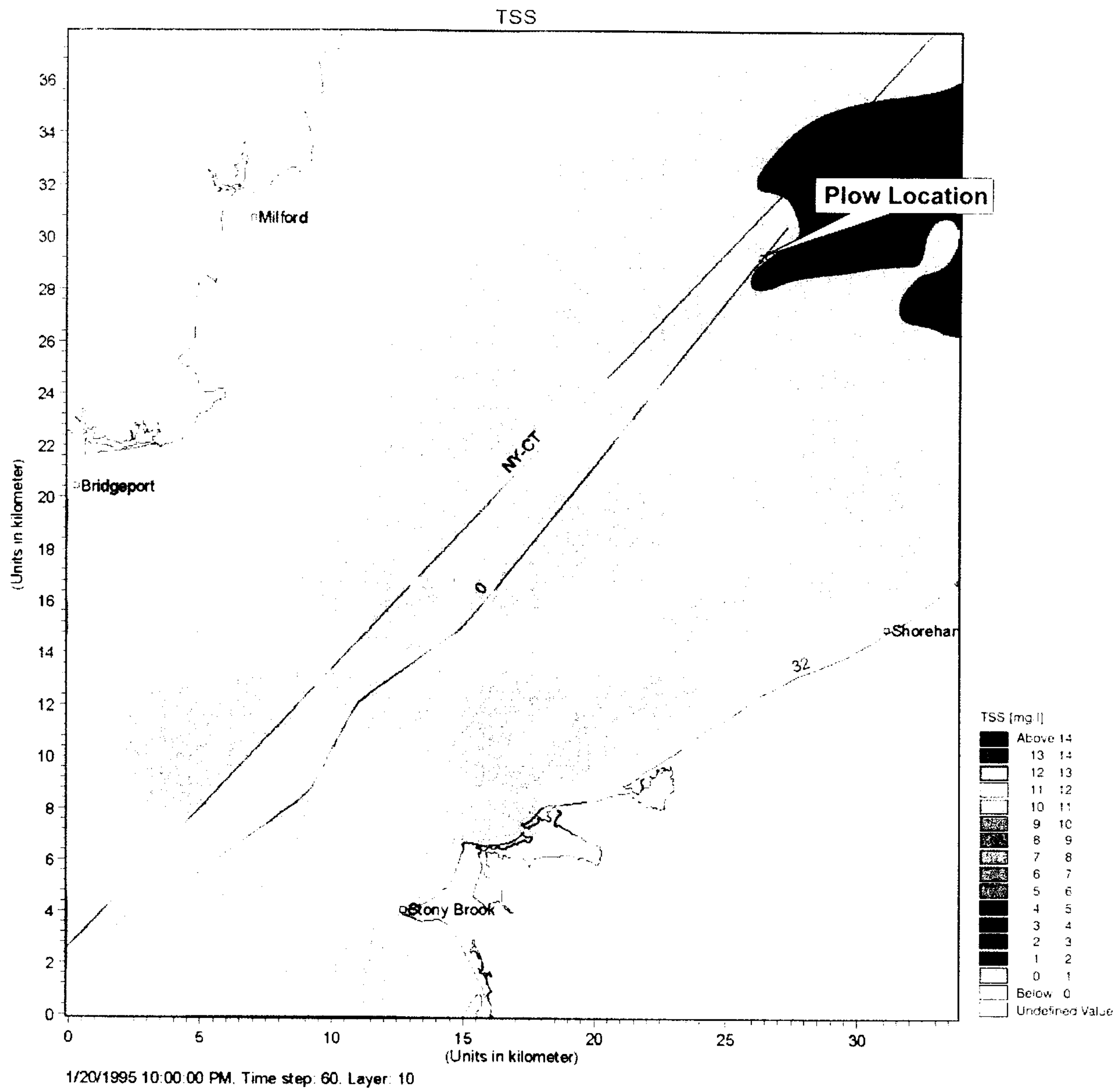

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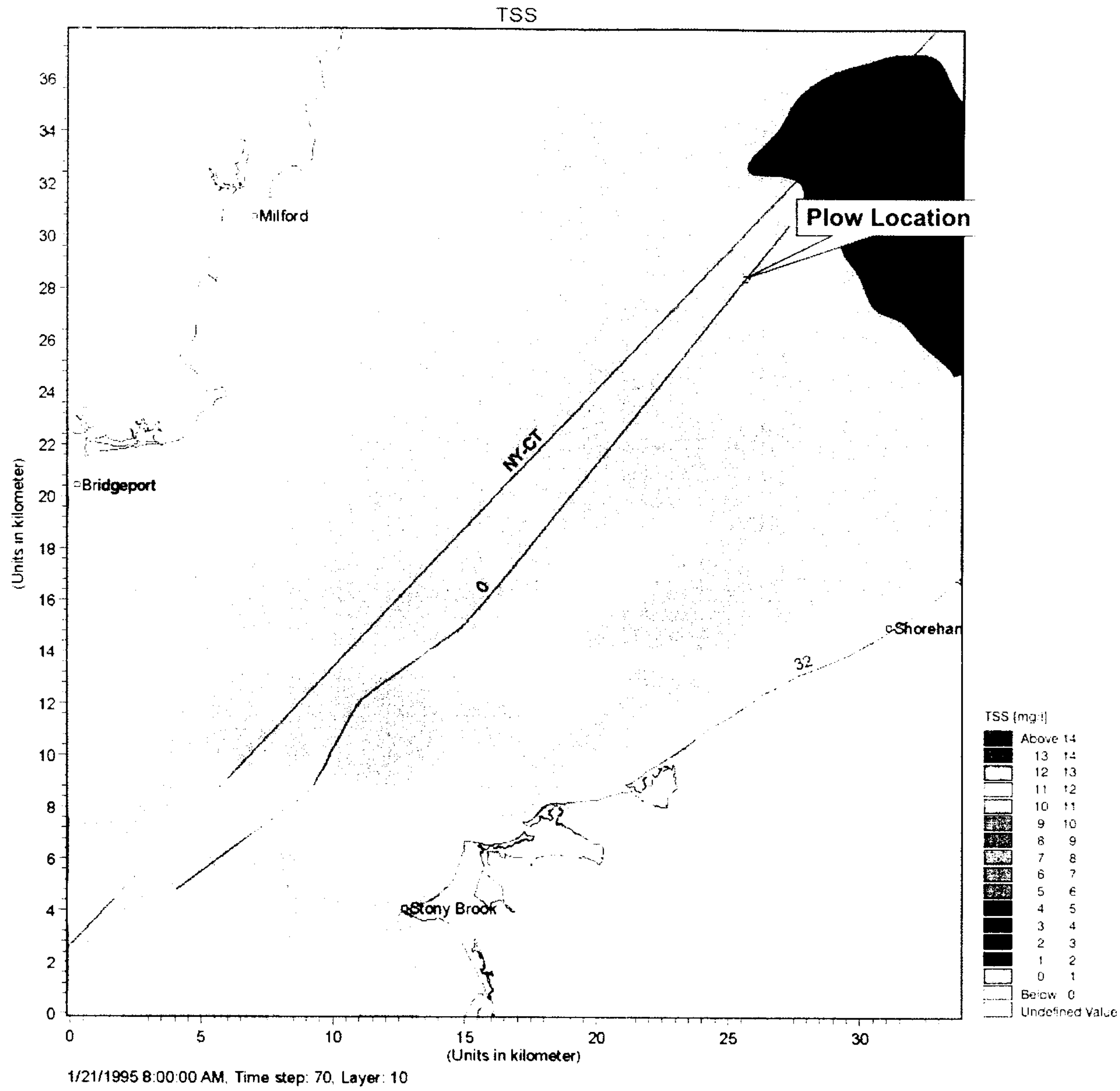
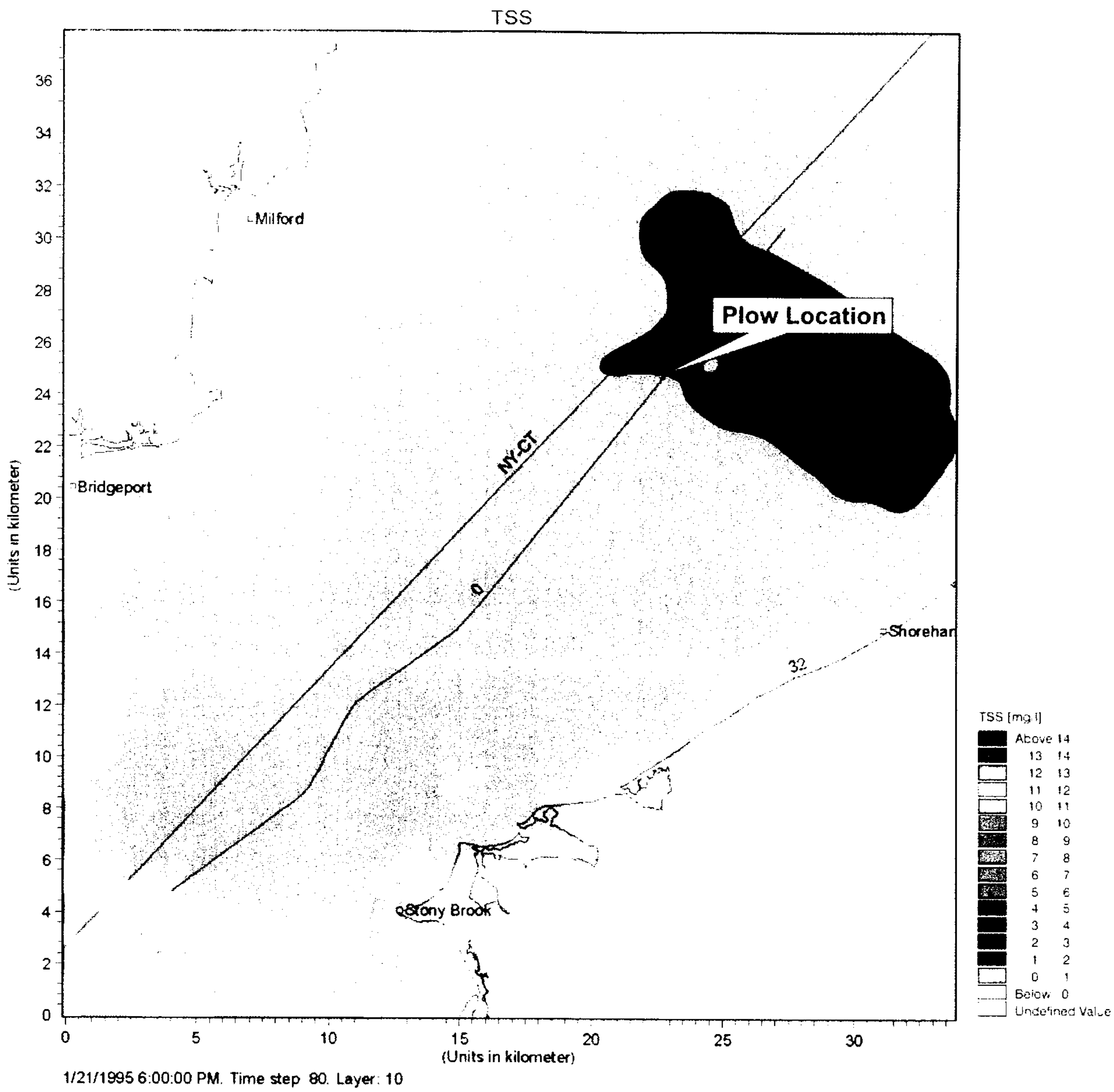


Figure 3 Surface at Timestep = 70



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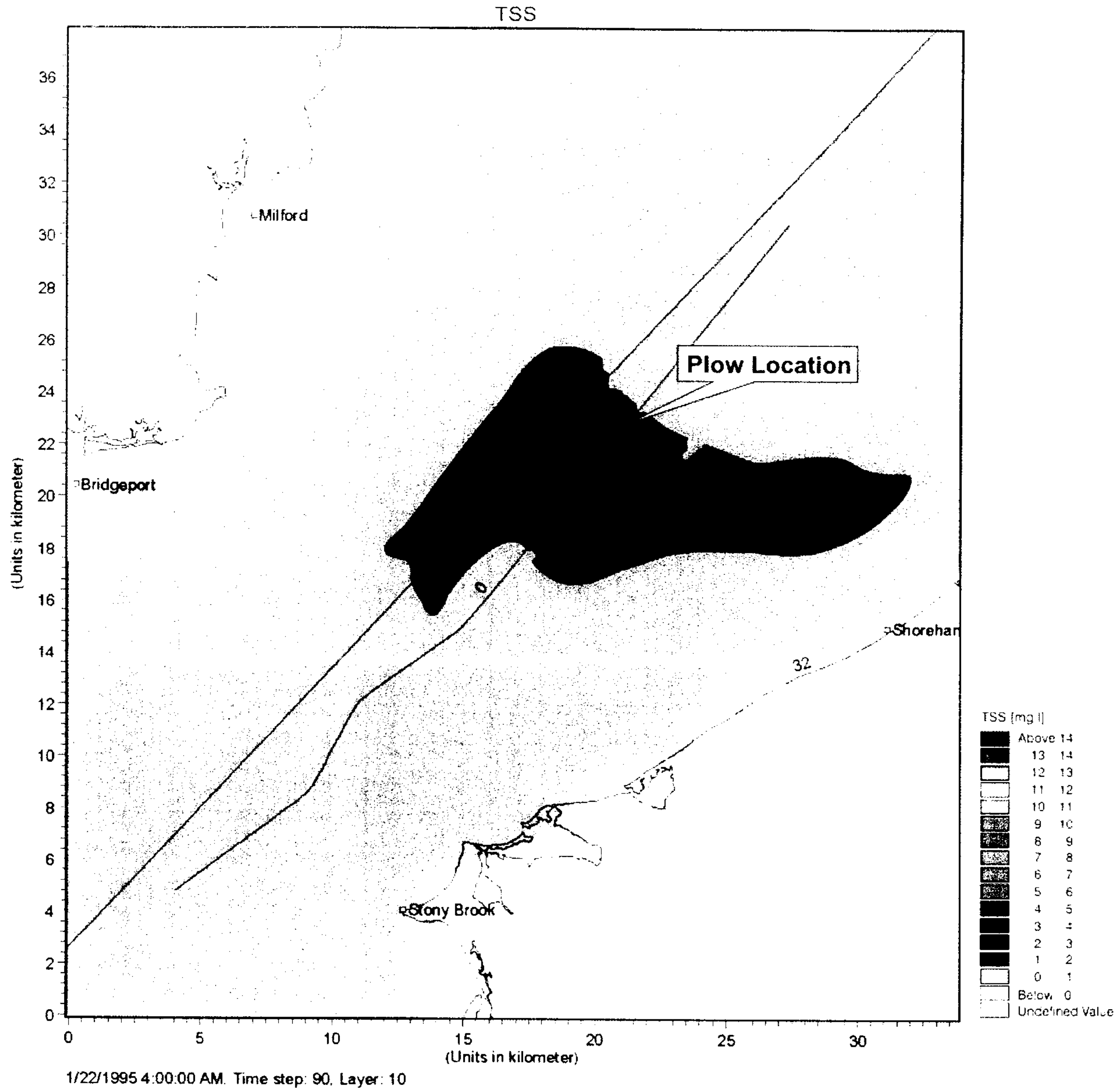
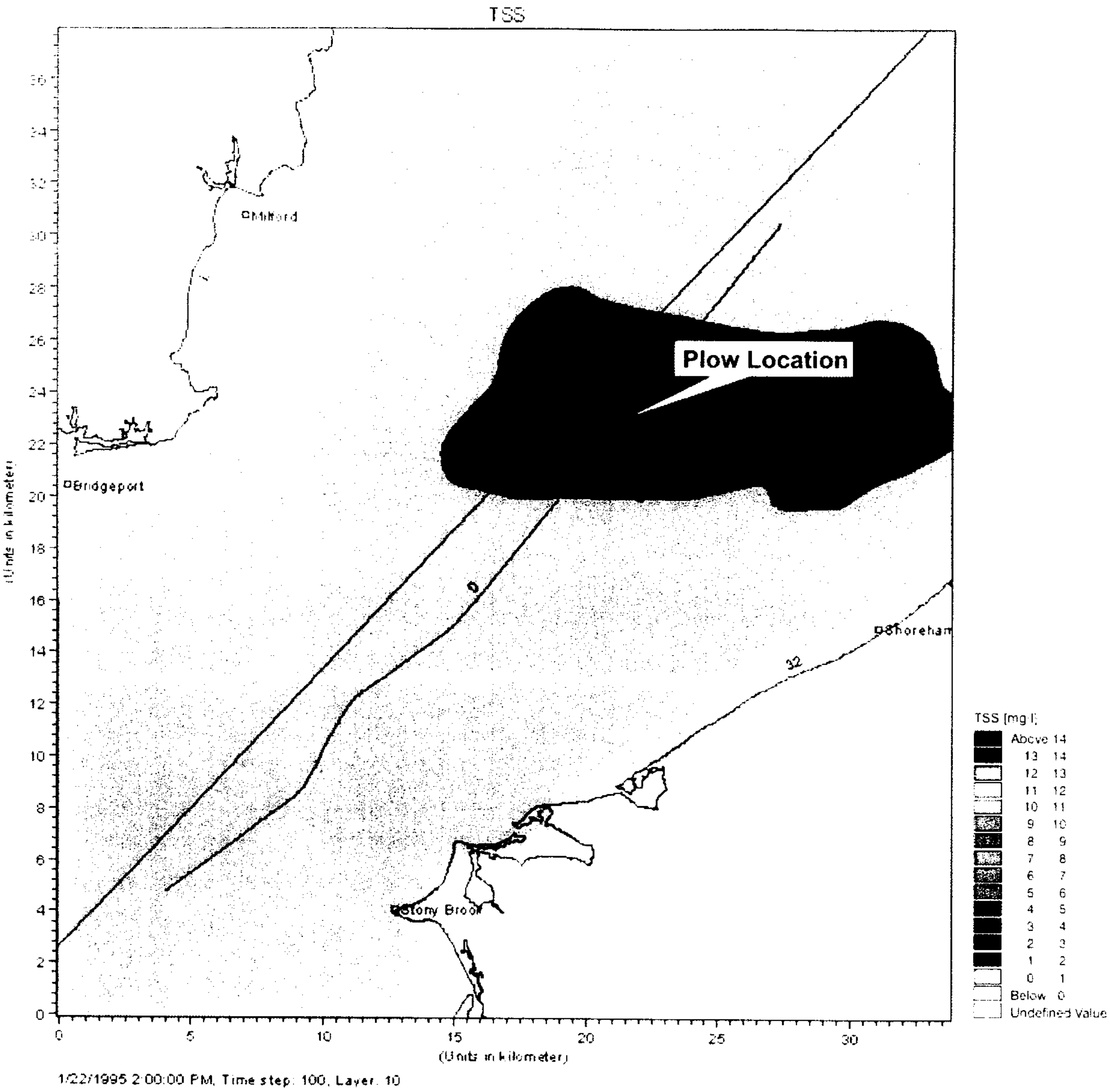


Figure 5 Surface at Timestep = 90

PUBLIC

BW002739



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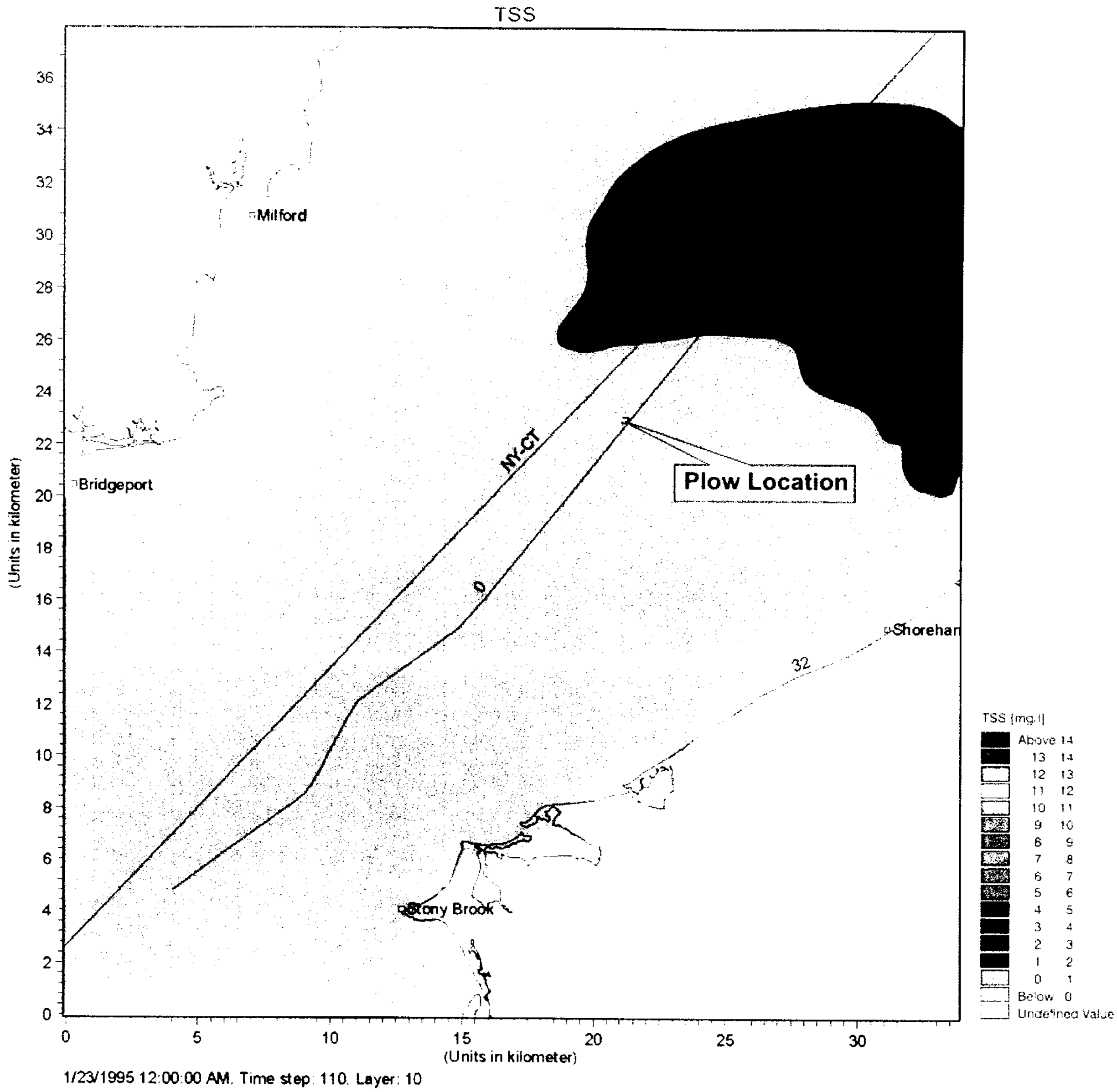

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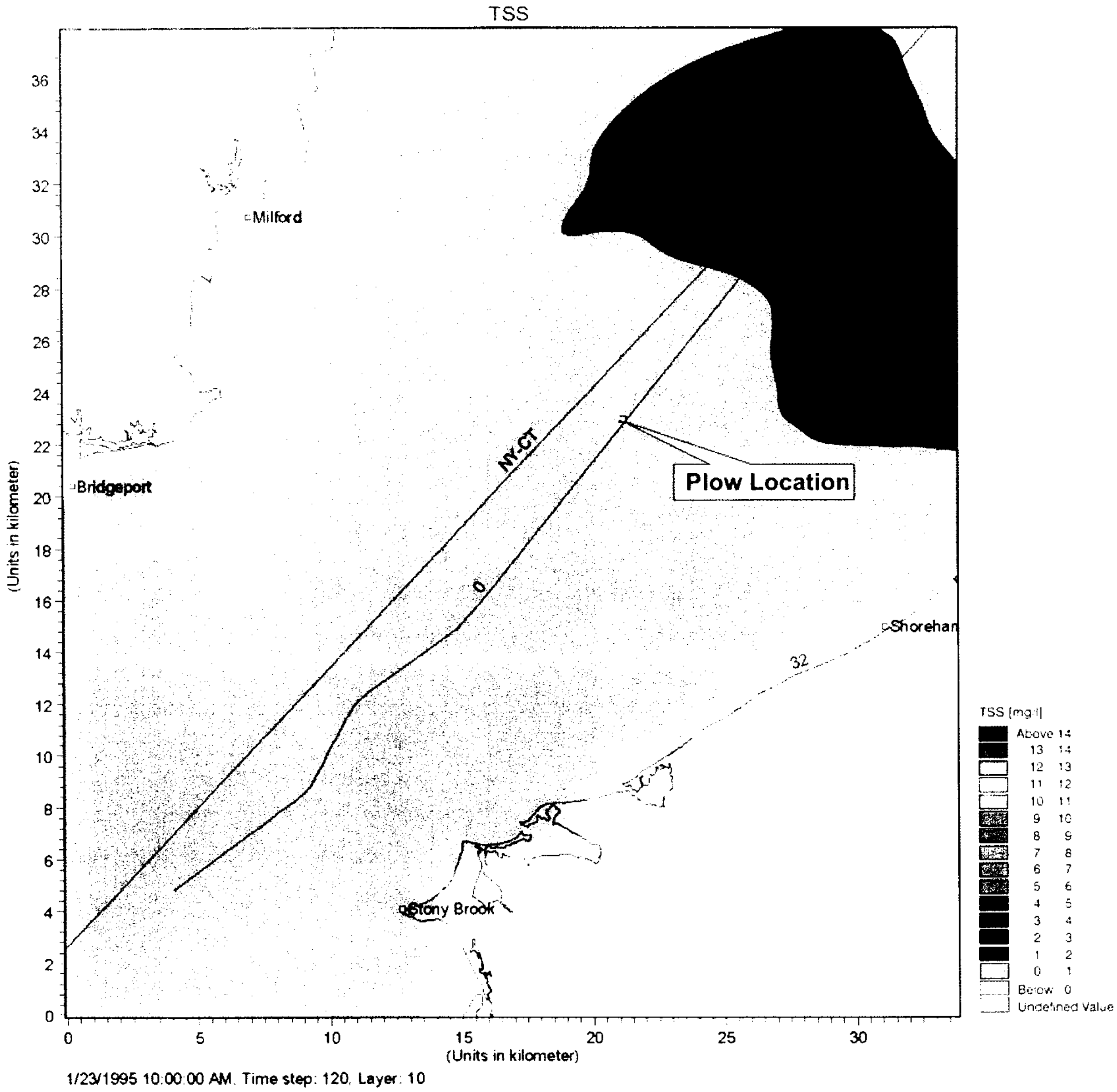

Figure 8 Surface at Timestep = 120

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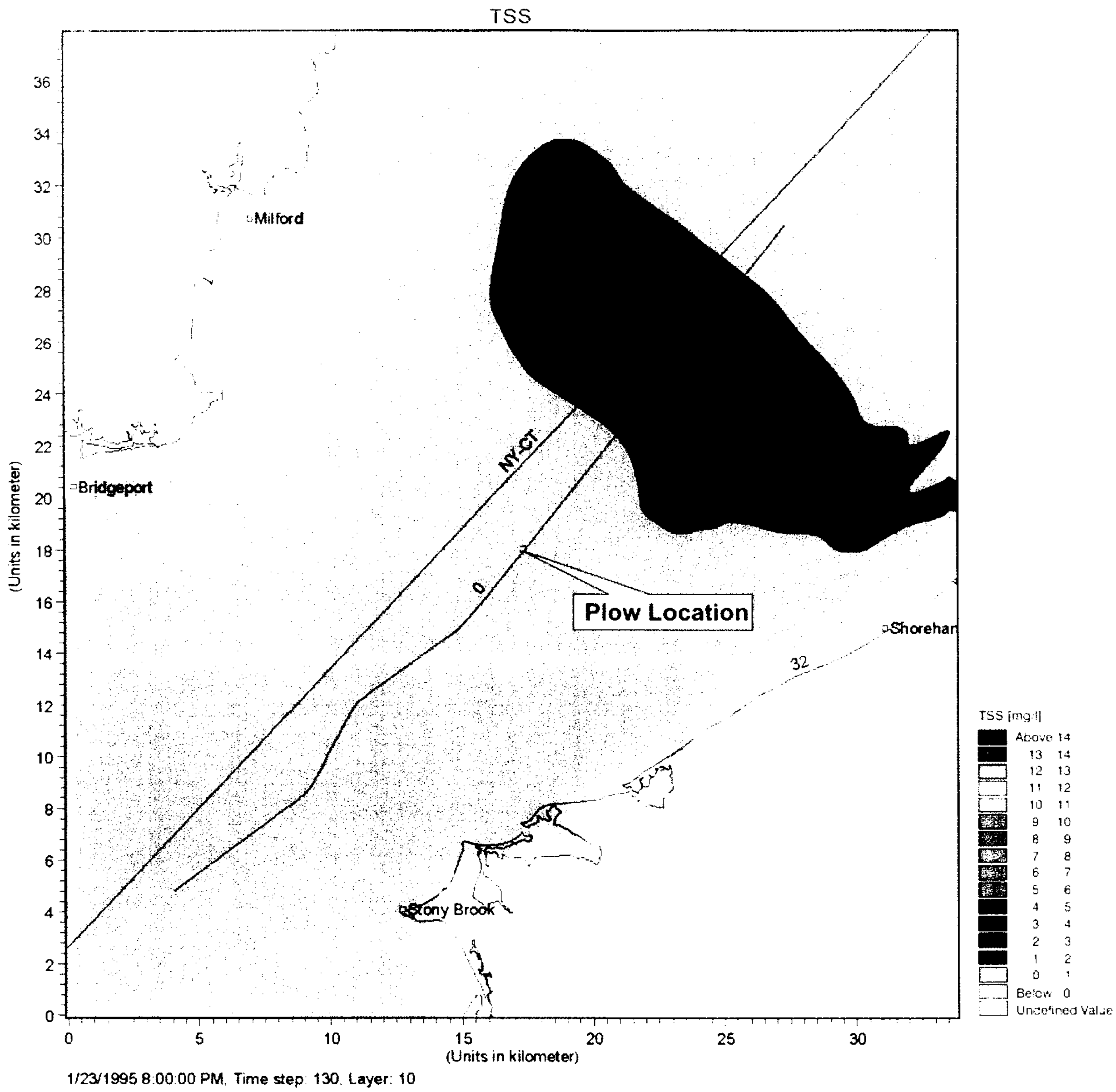

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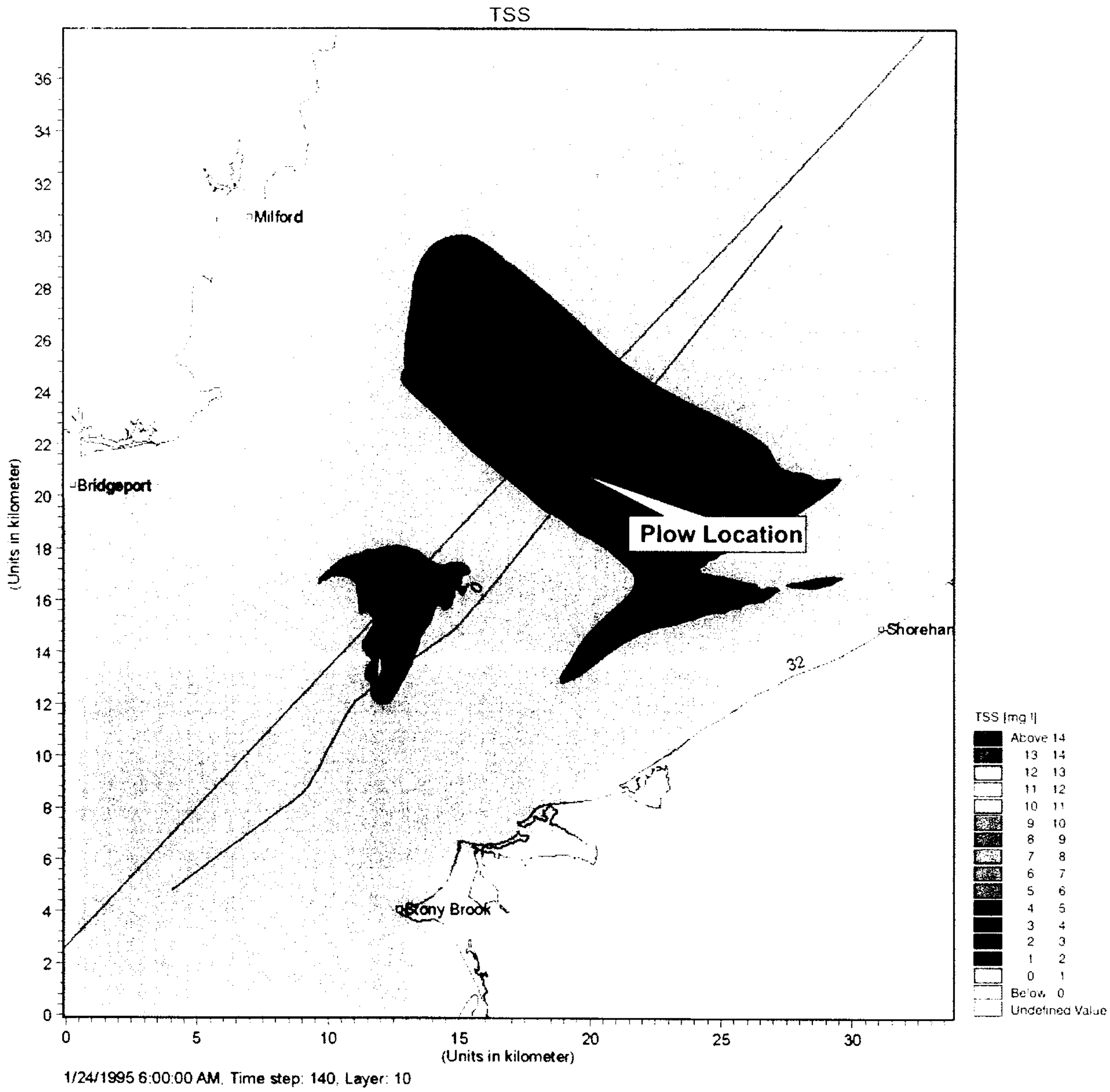

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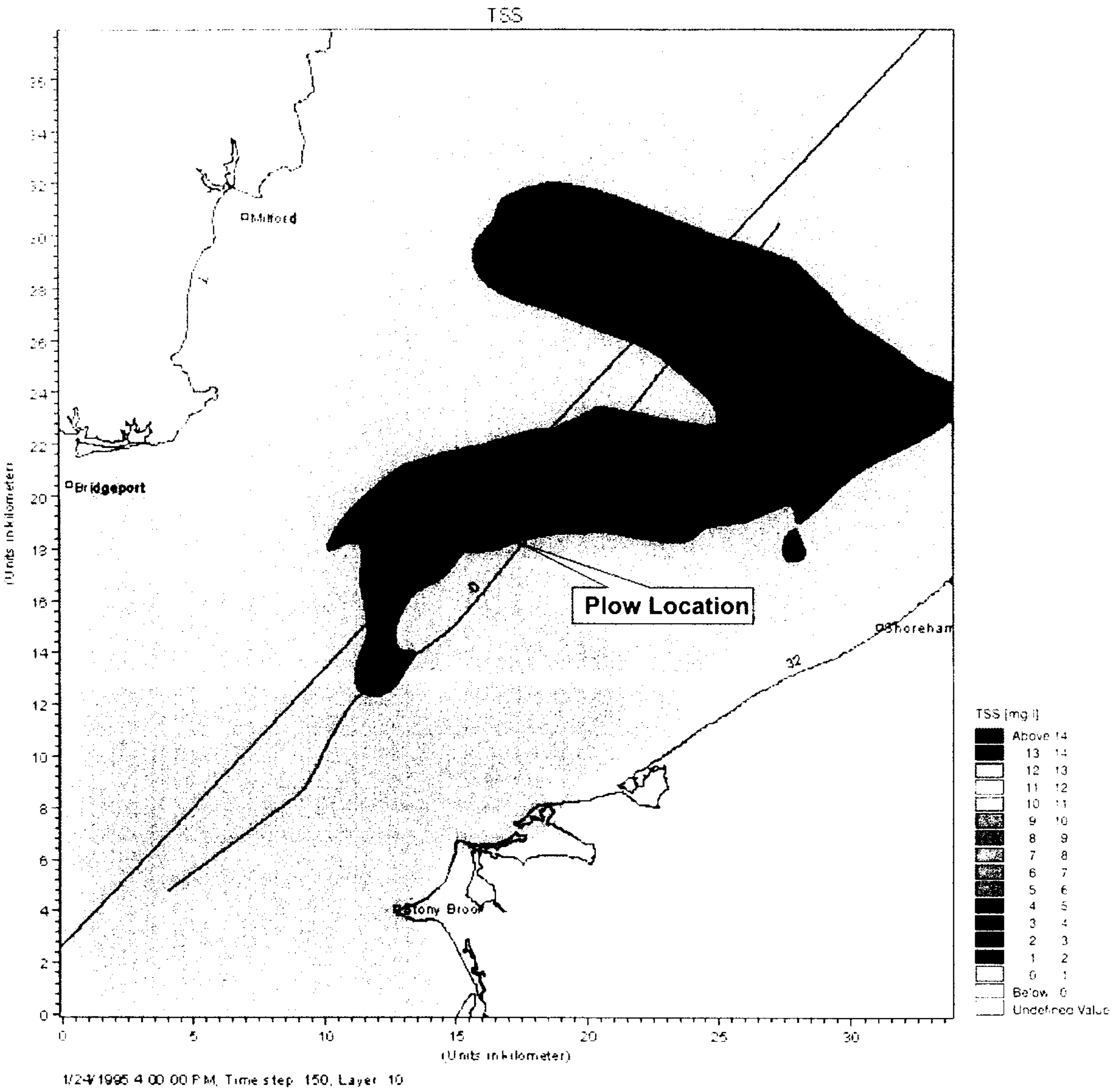

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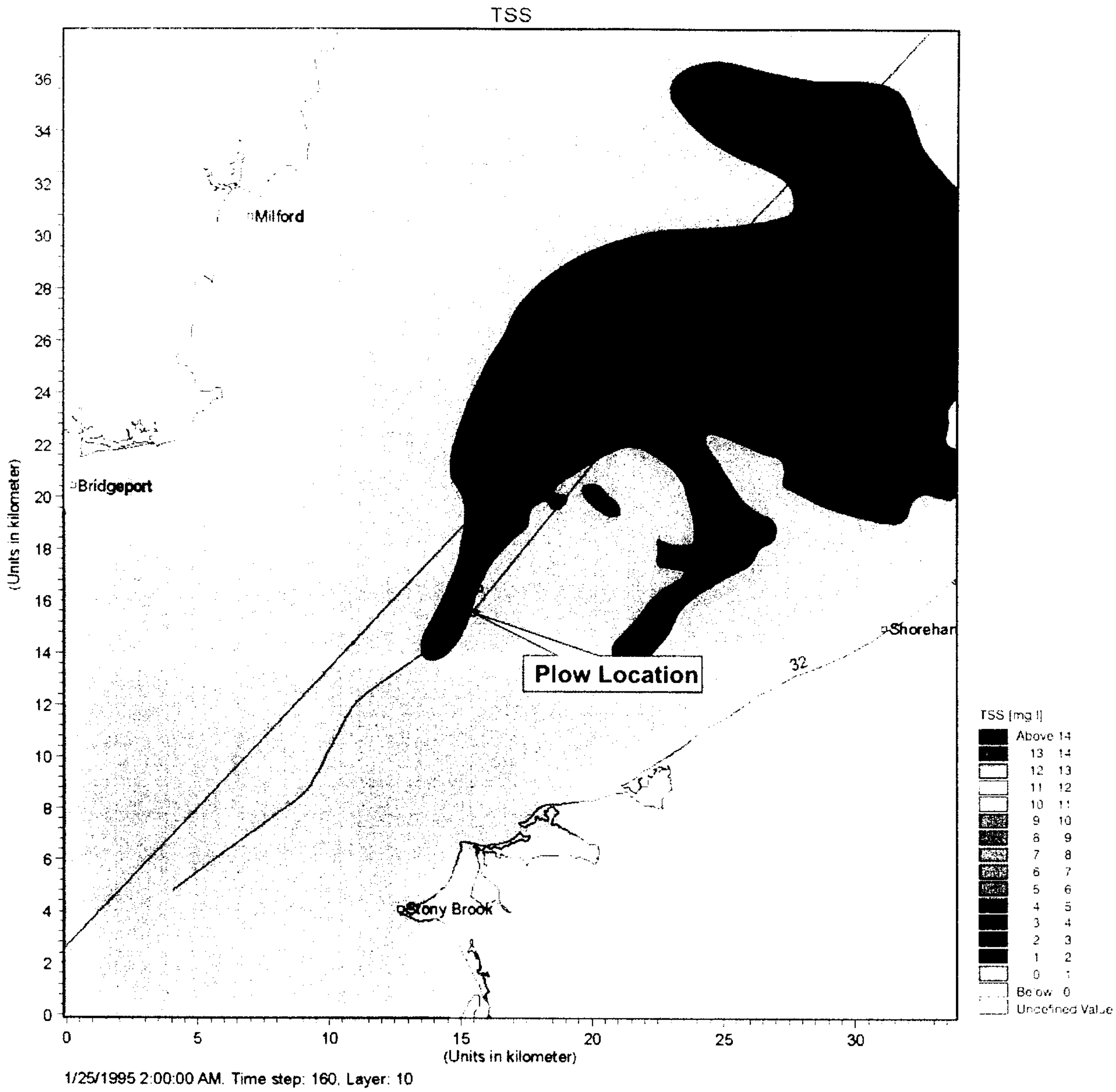

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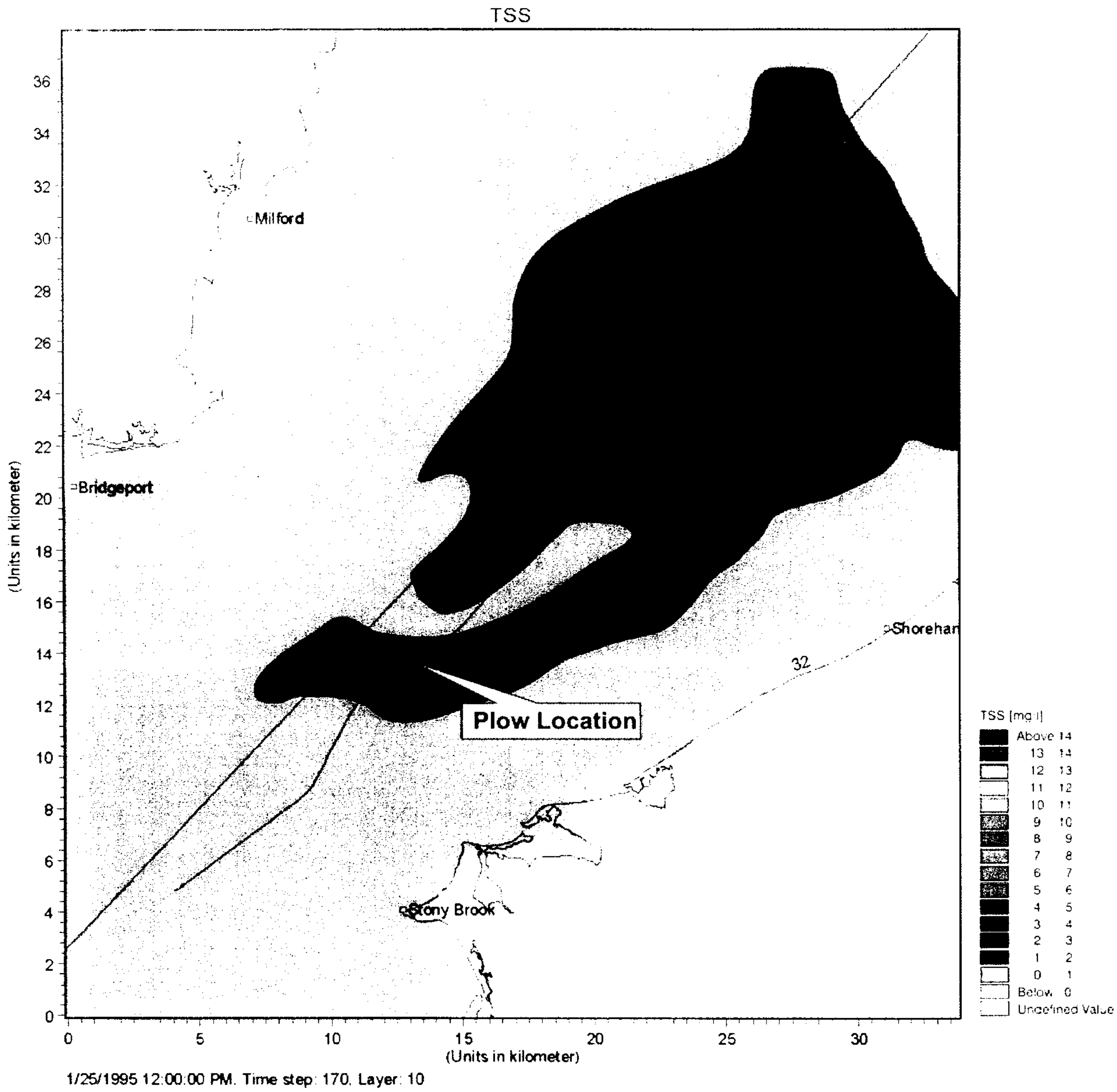

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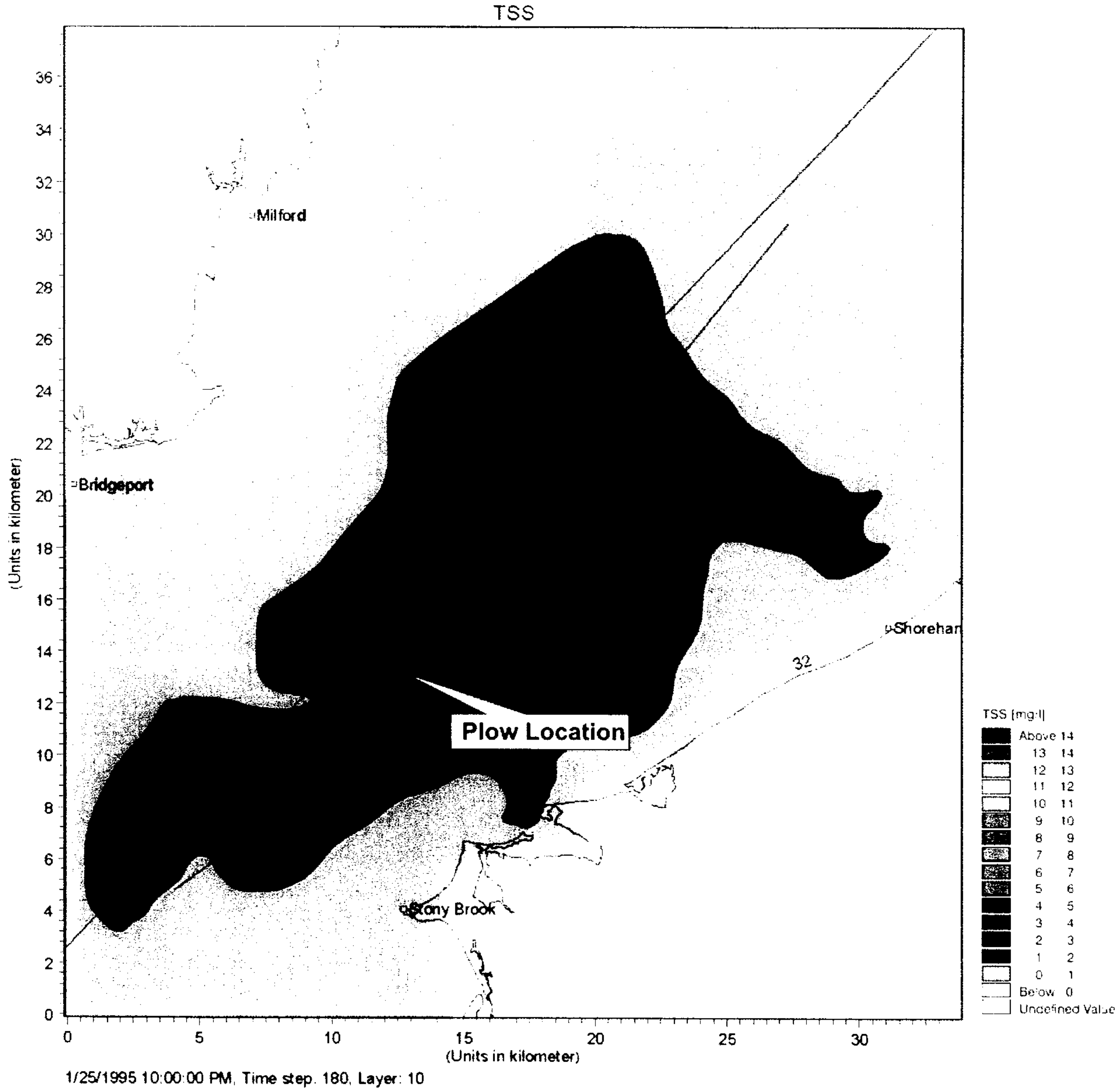

Figure 14 Surface at Timestep = 180

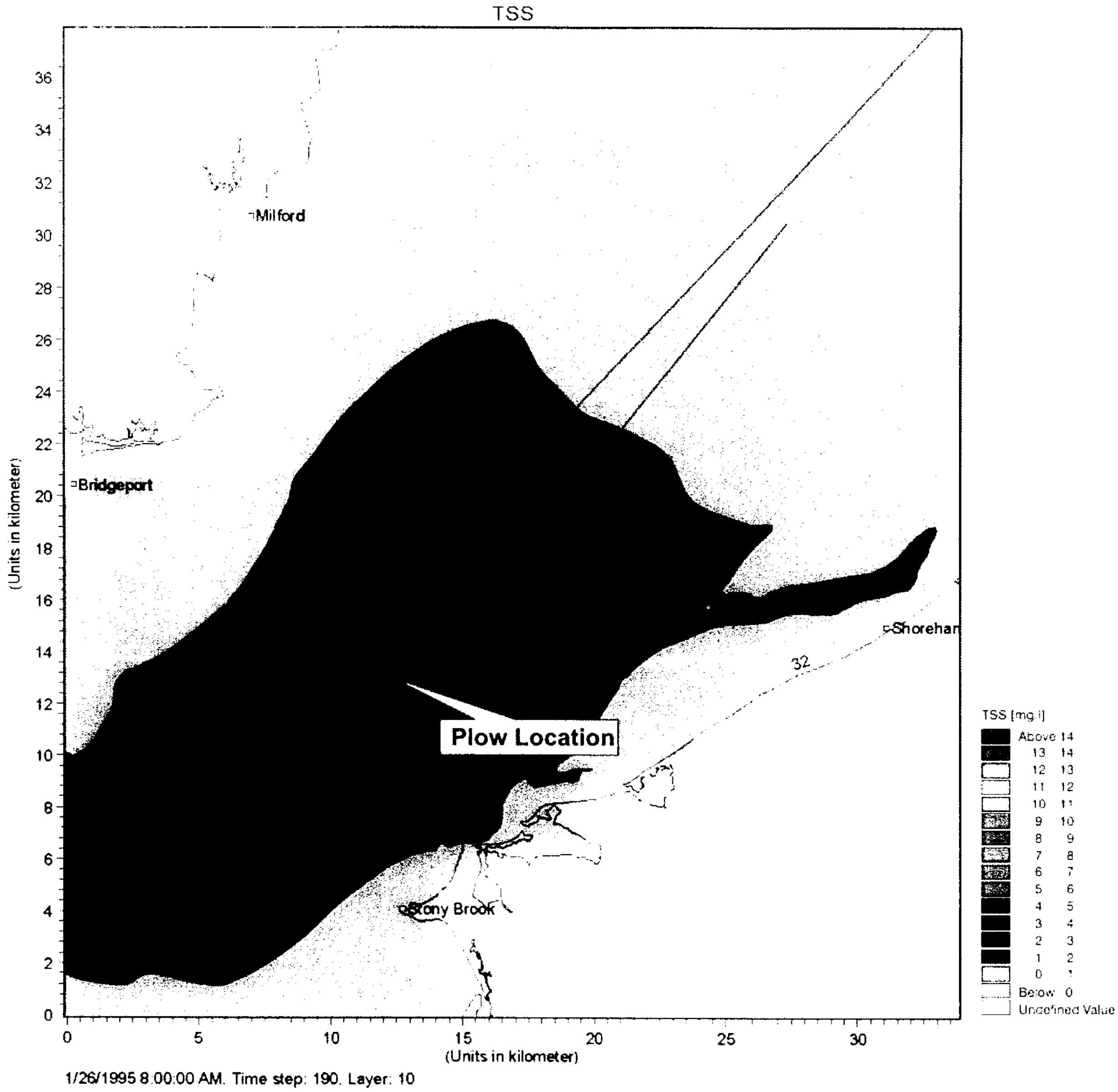

Figure 15 Surface at Timestep = 190

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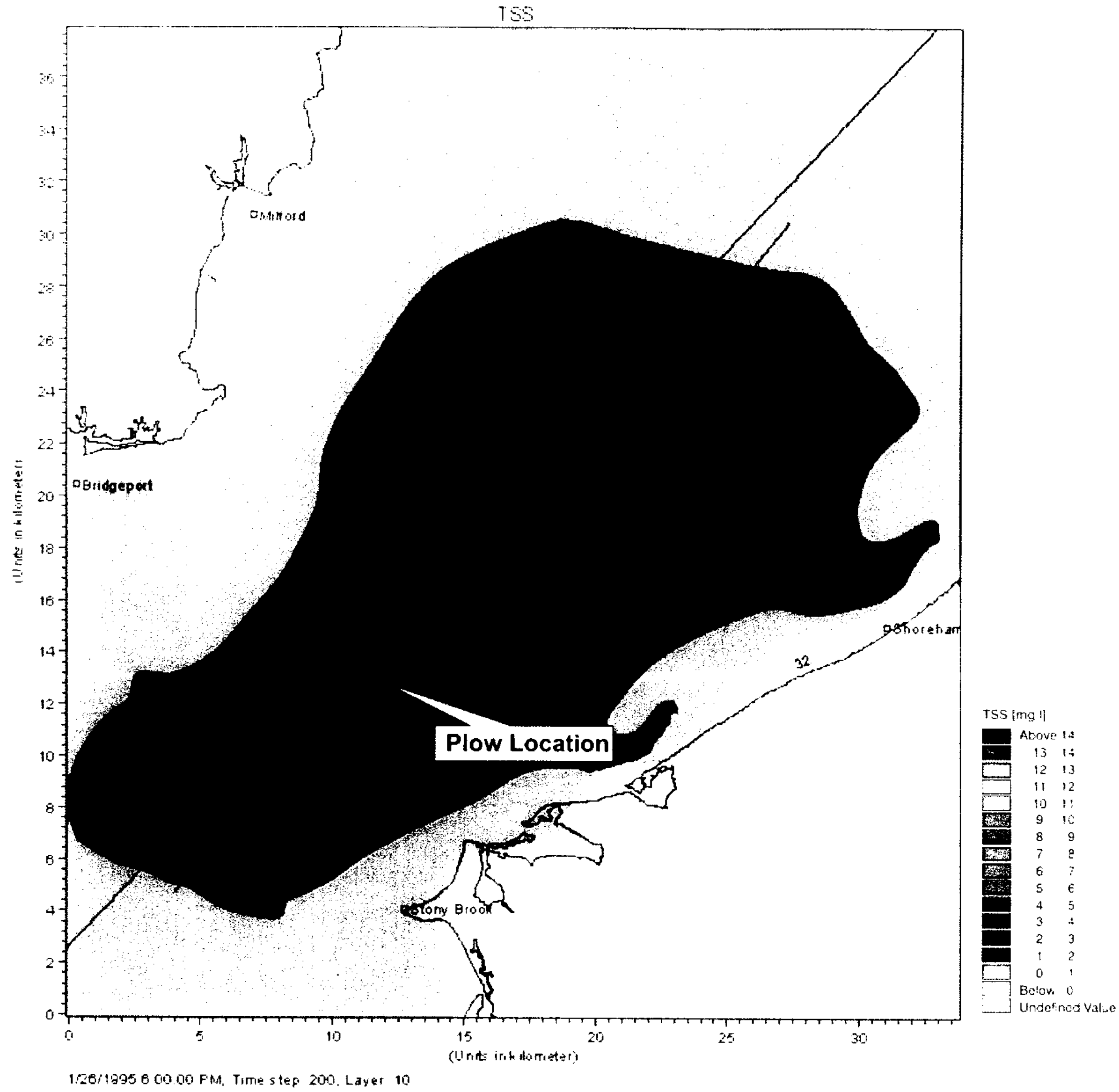
BW002749



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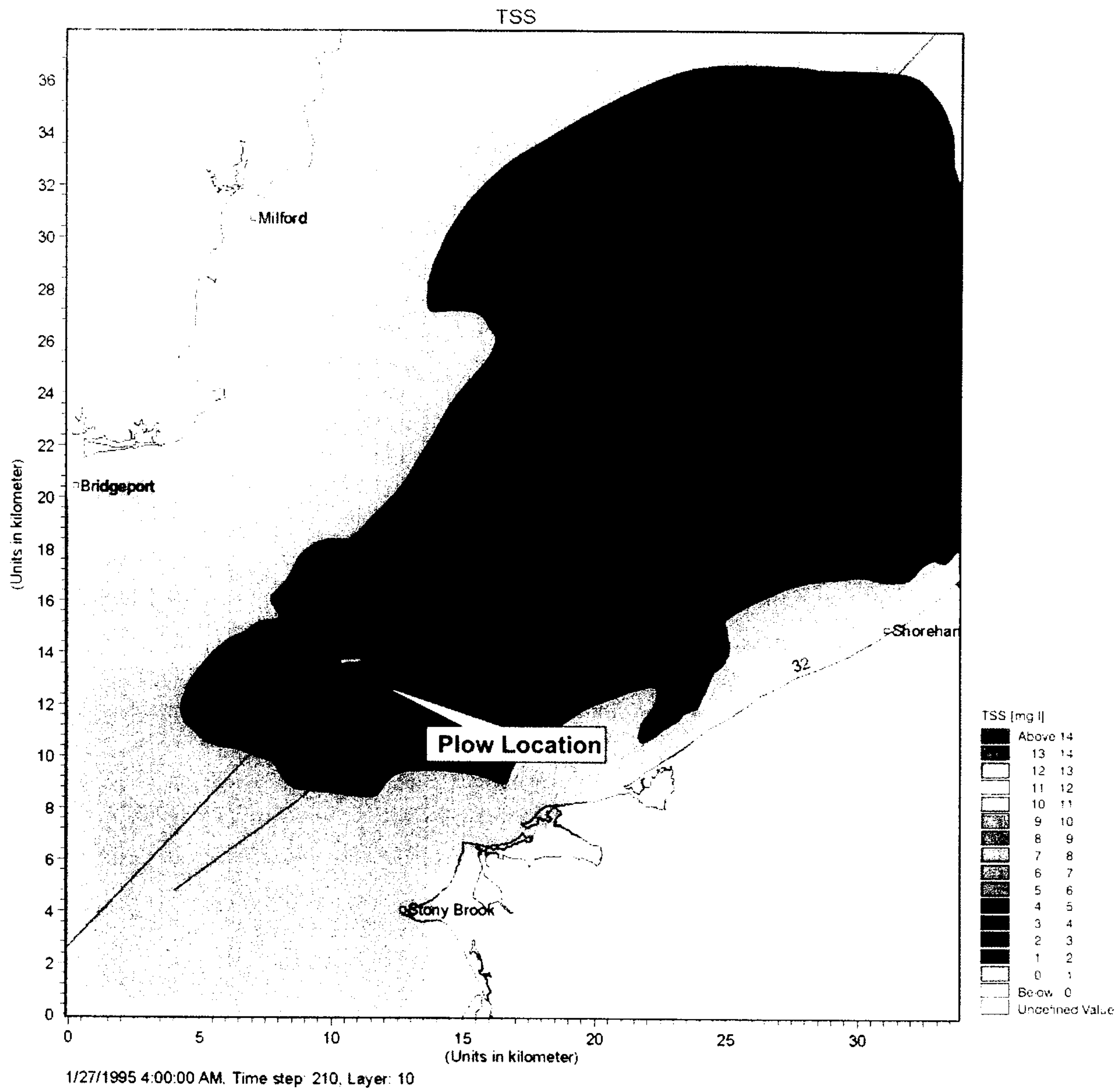

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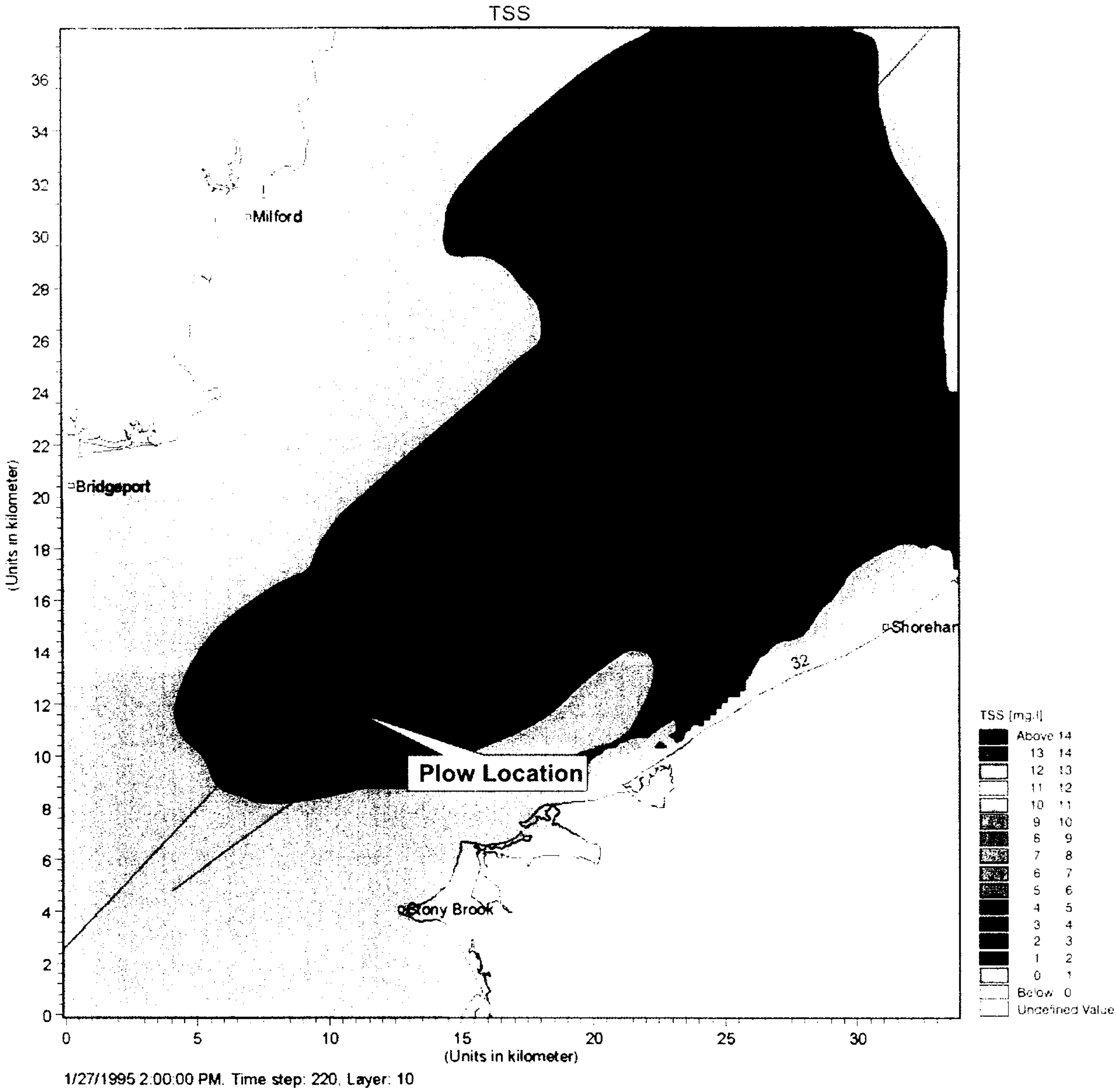

Figure 18 Surface at Timestep = 220

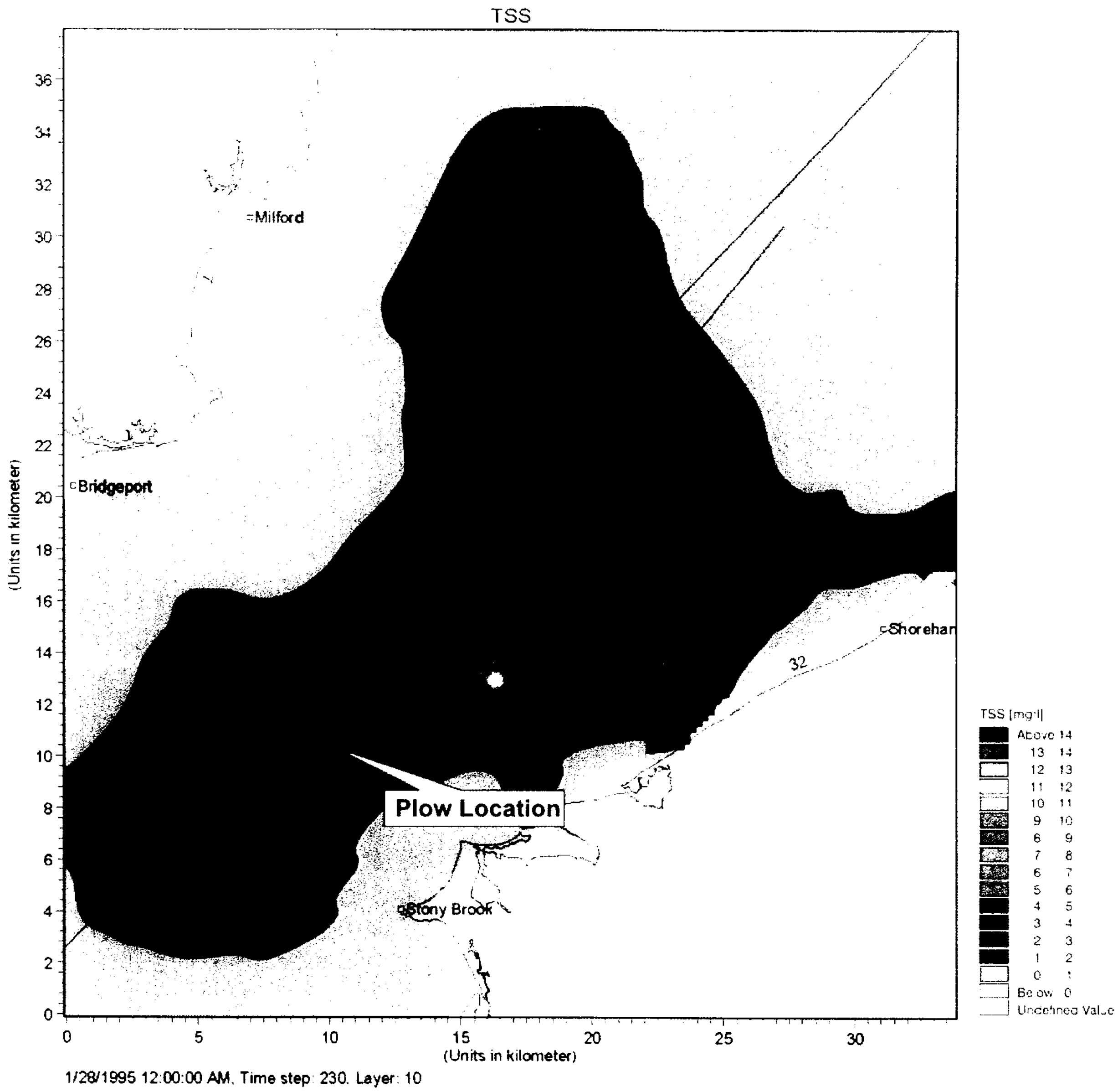

Figure 19 Surface at Timestep = 230

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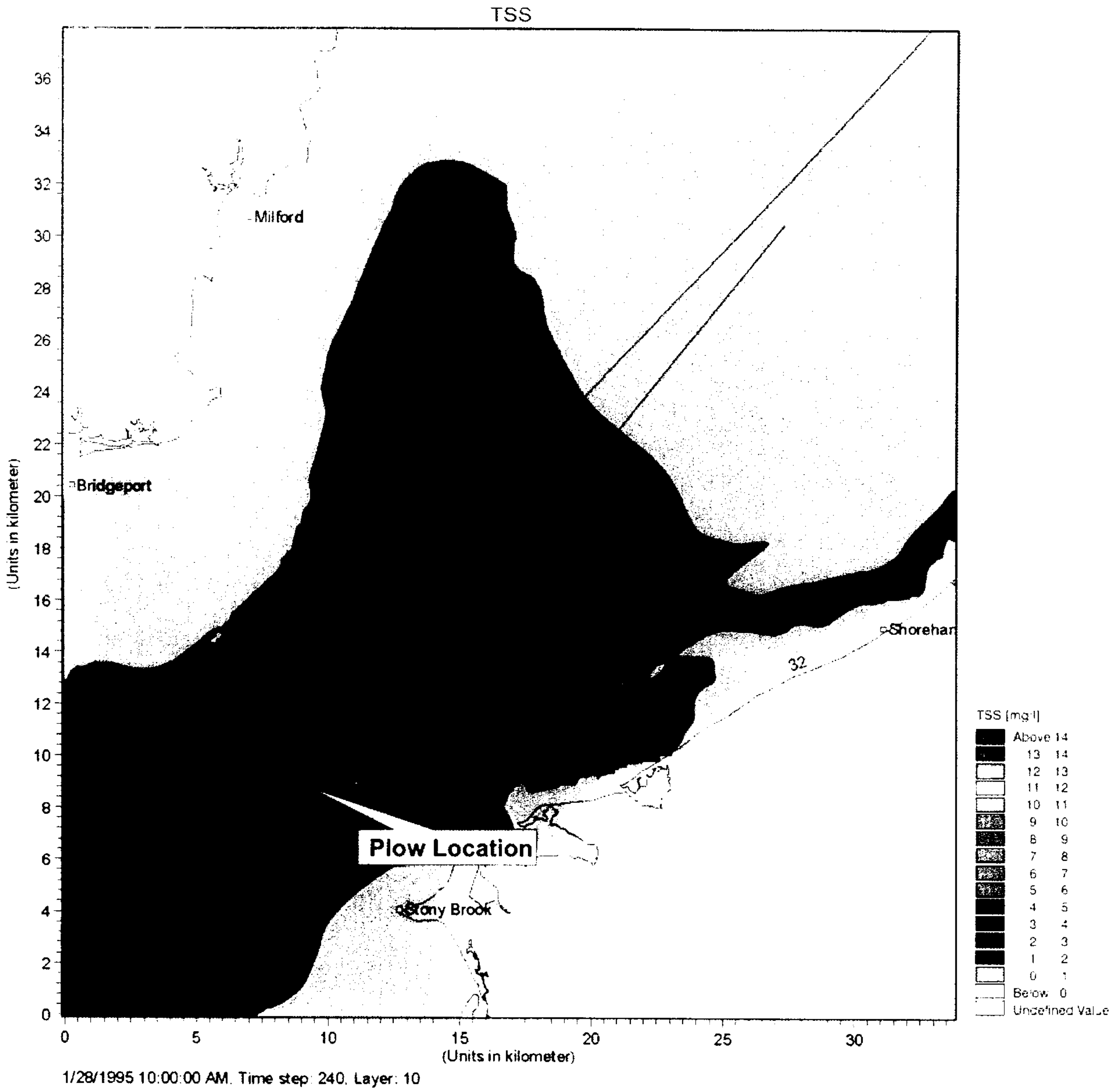

Figure 20 Surface at Timestep = 240

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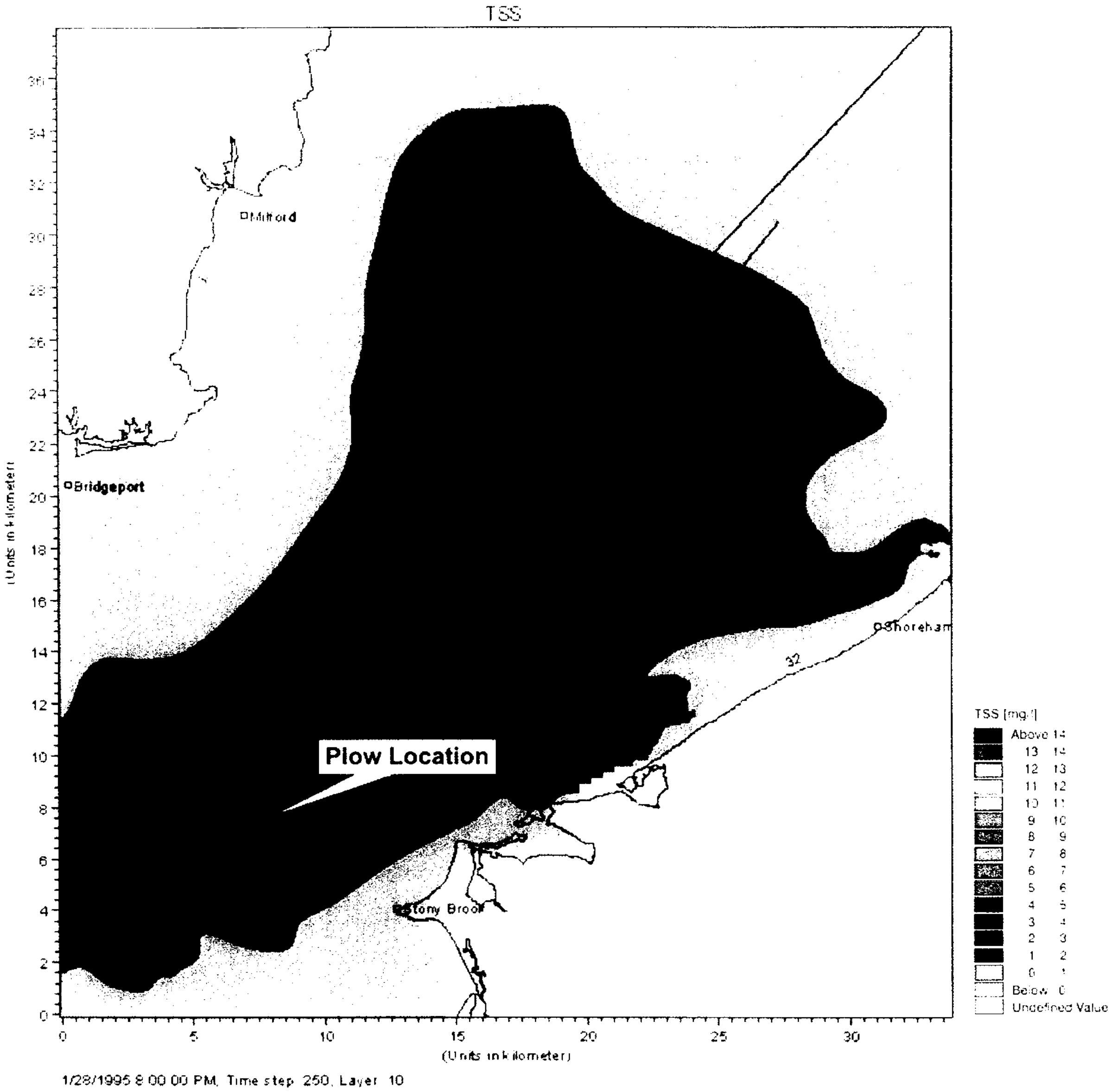

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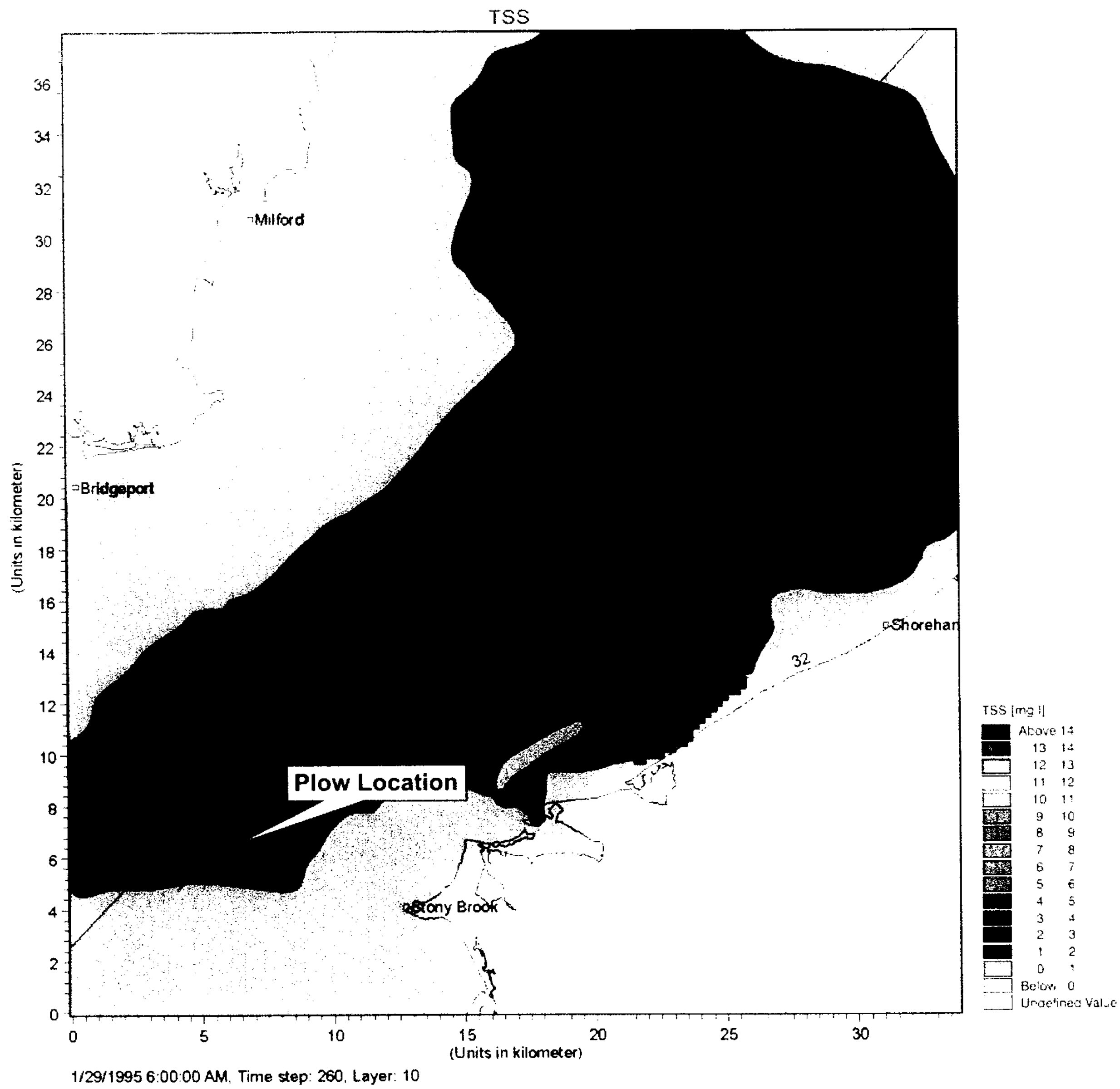

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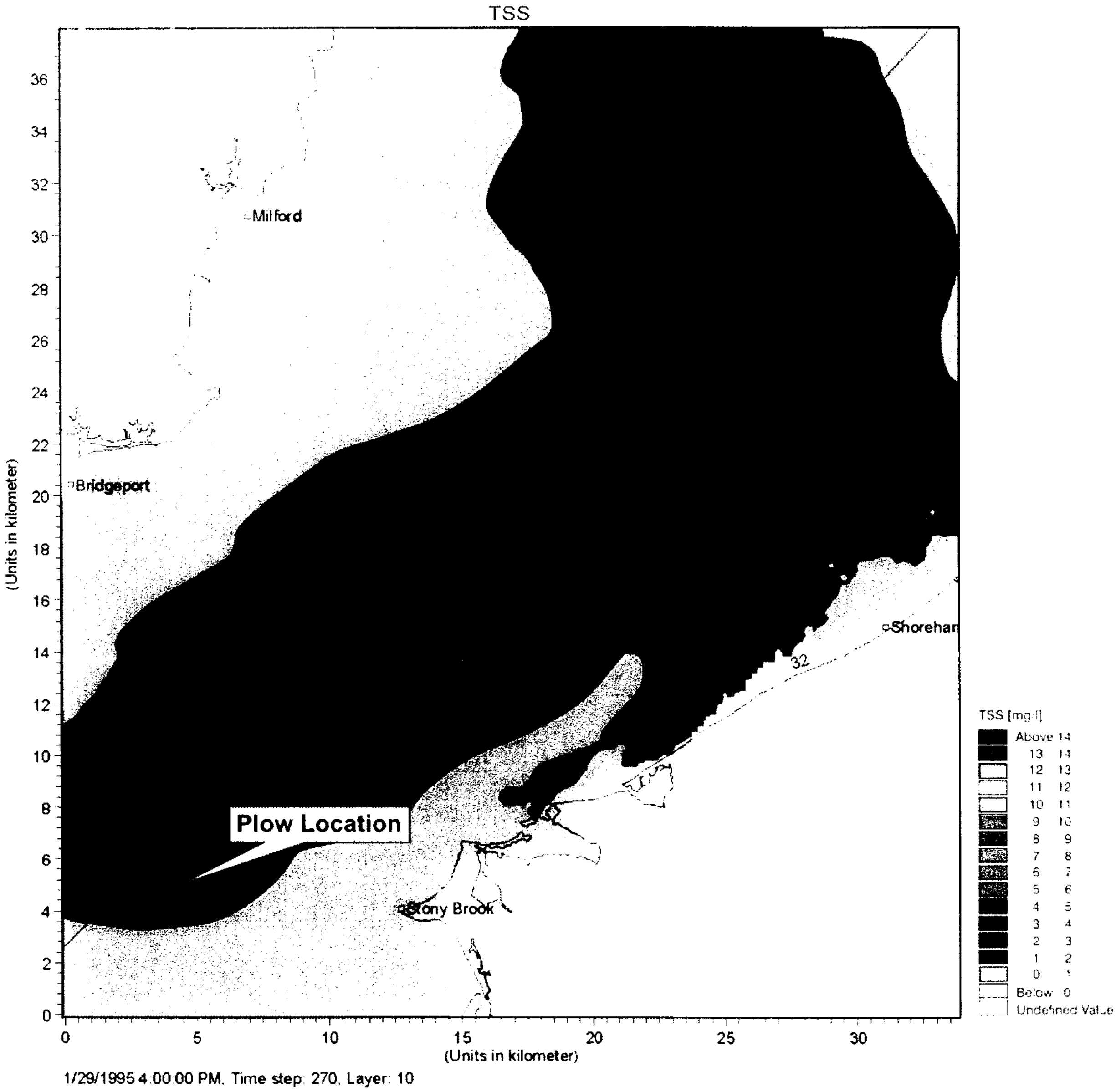

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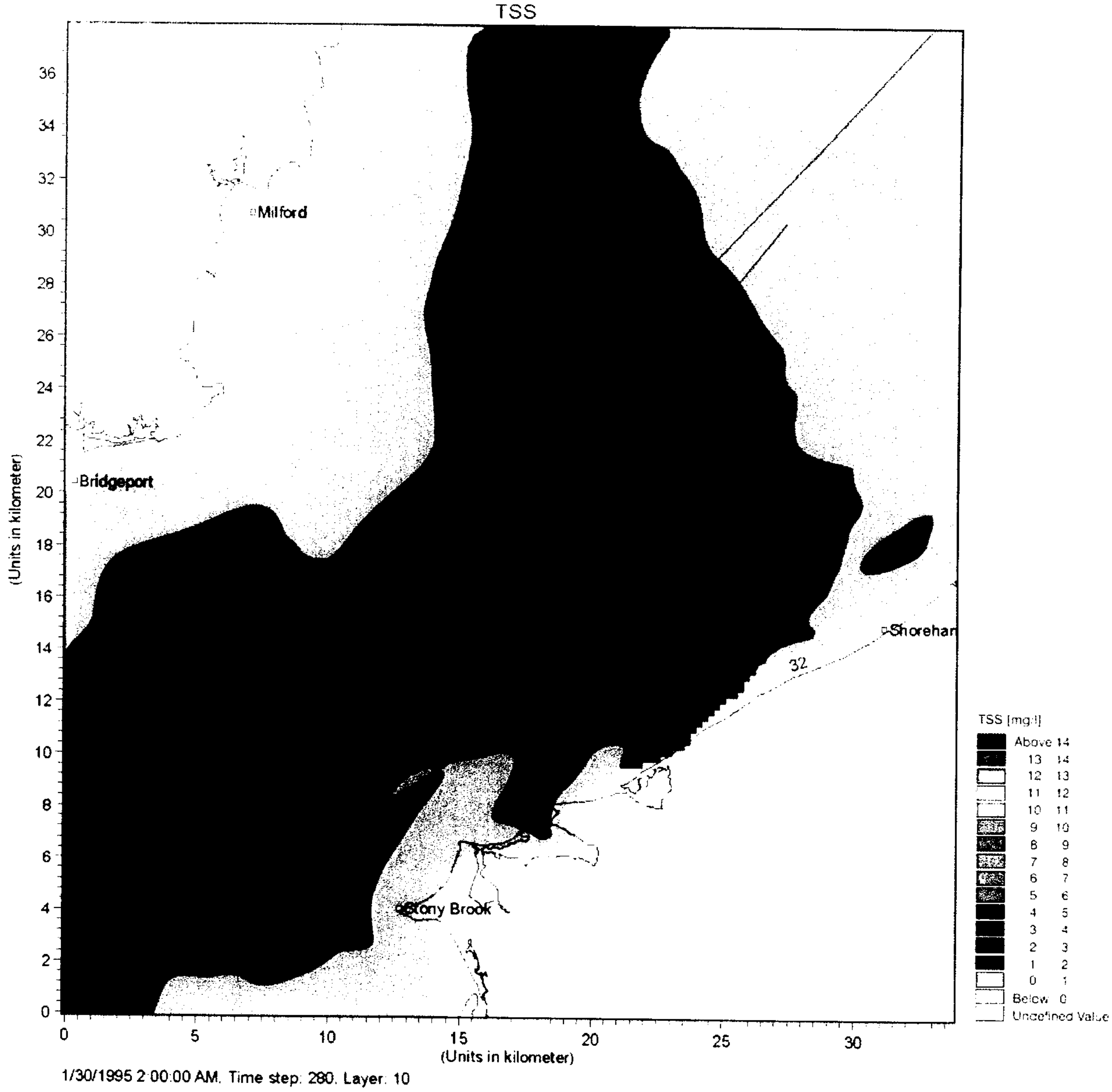
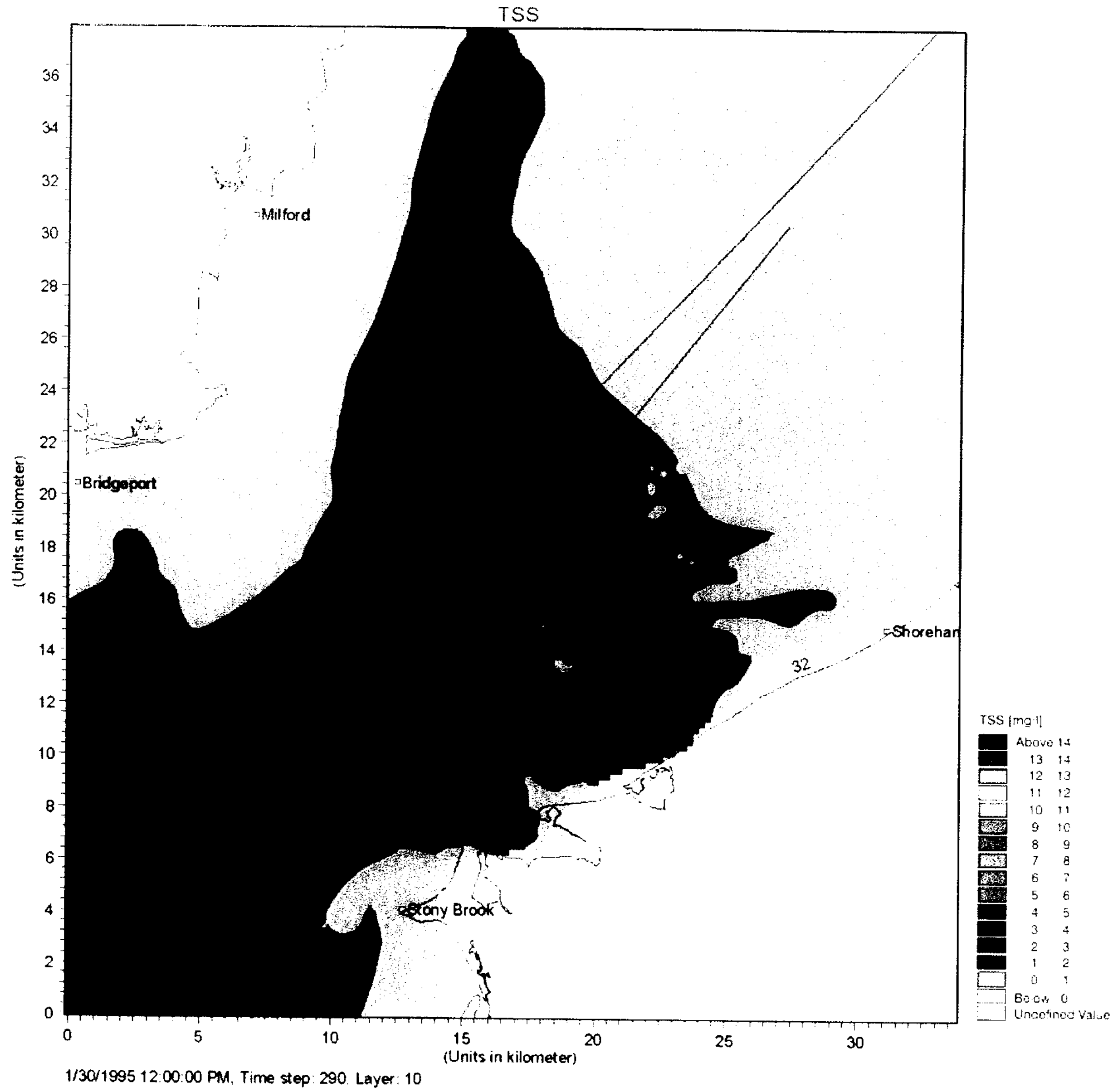


Figure 24 Surface at Timestep = 280 (8 hours after end of plowing)



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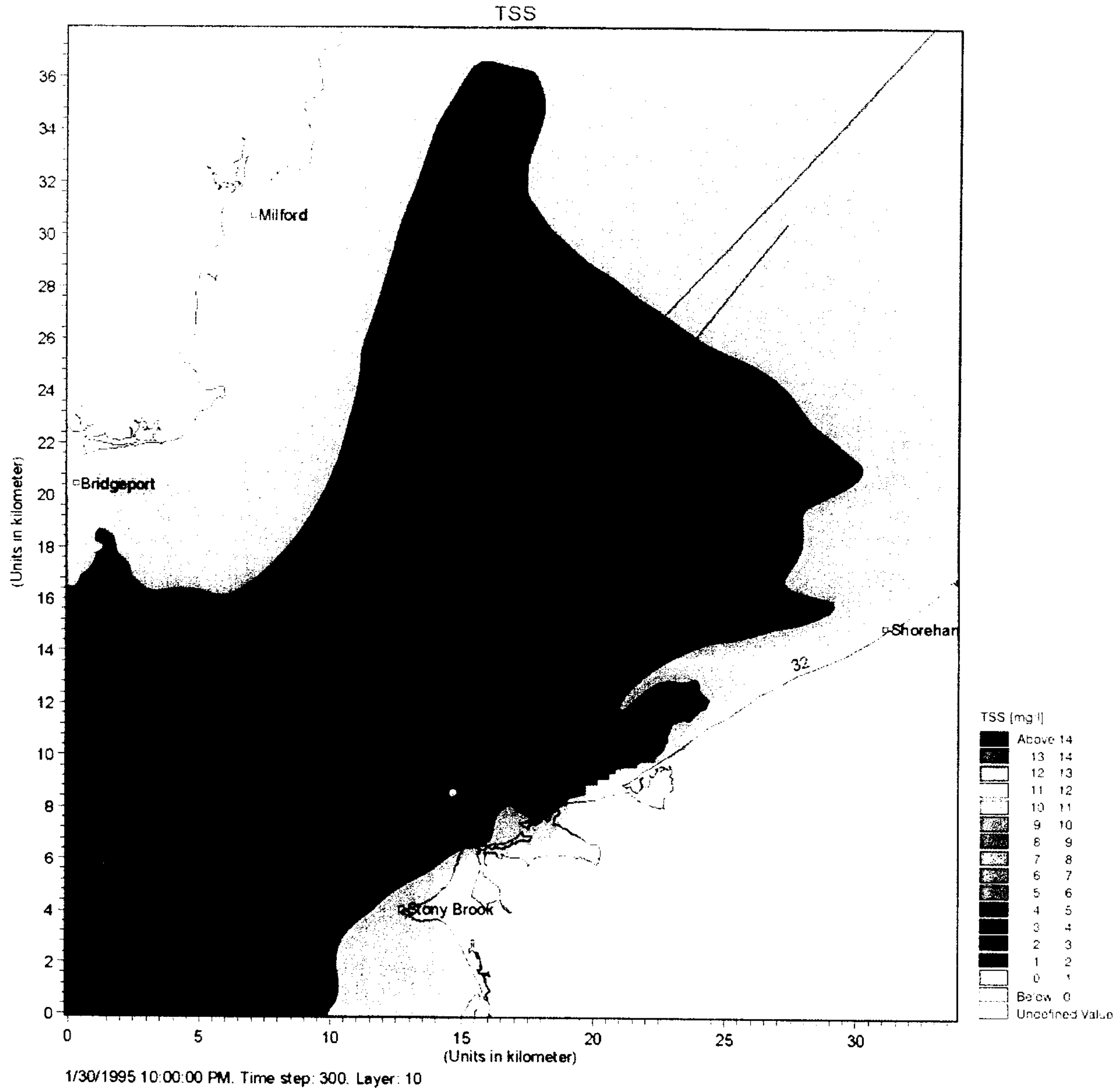

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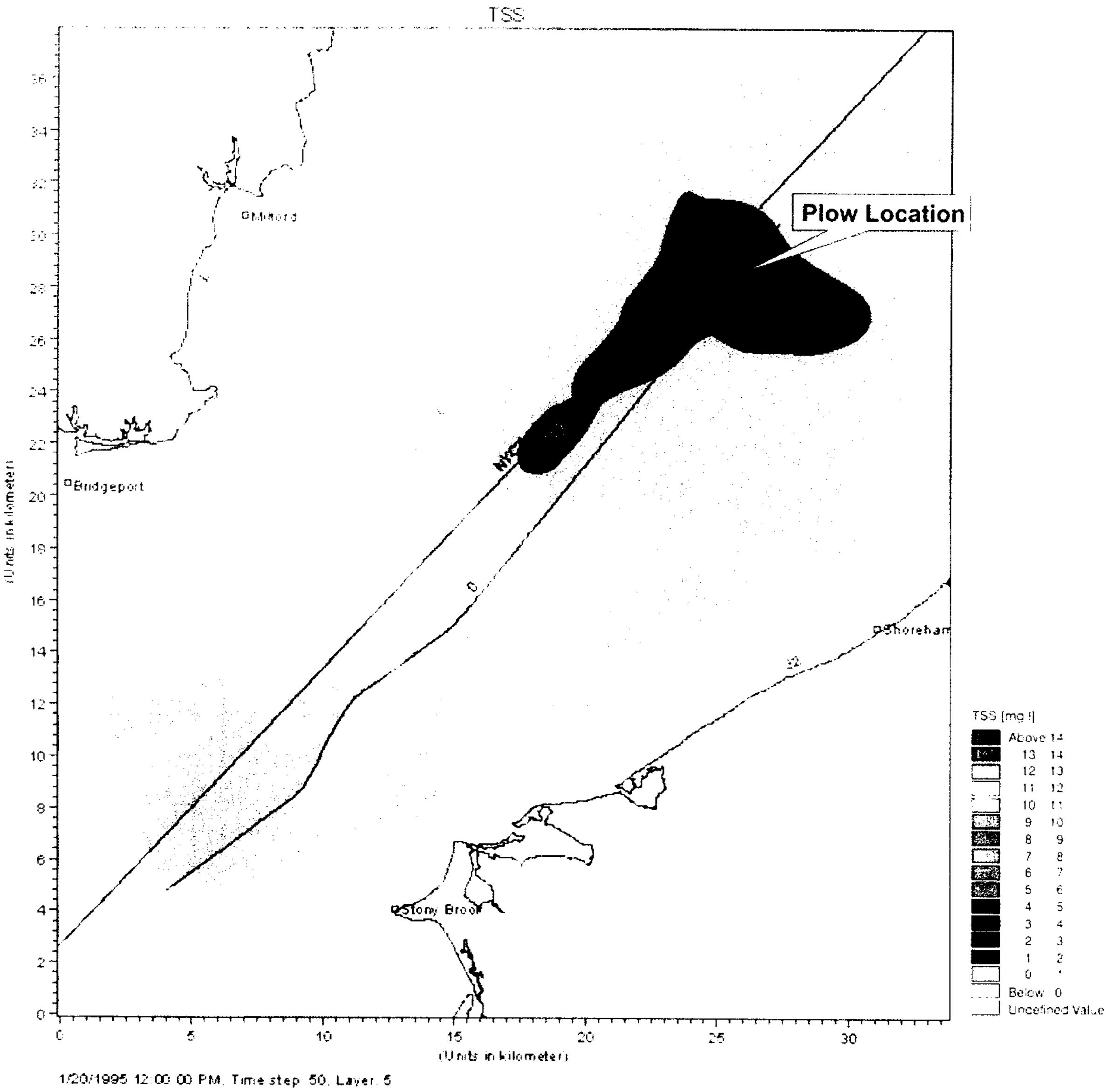

Figure 27 Mid-depth at Timestep = 50

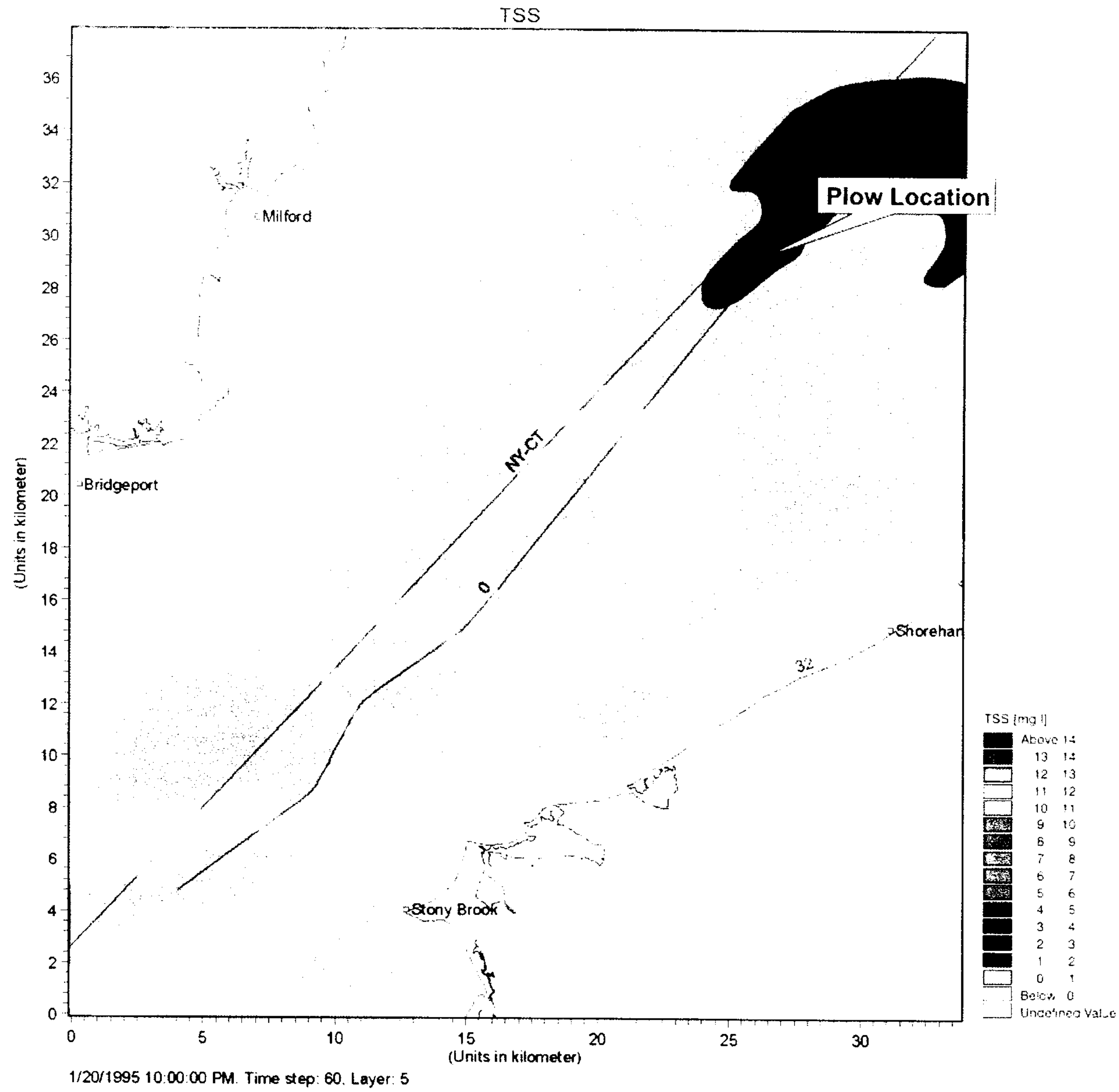

Figure 28 Mid-depth at Timestep = 60

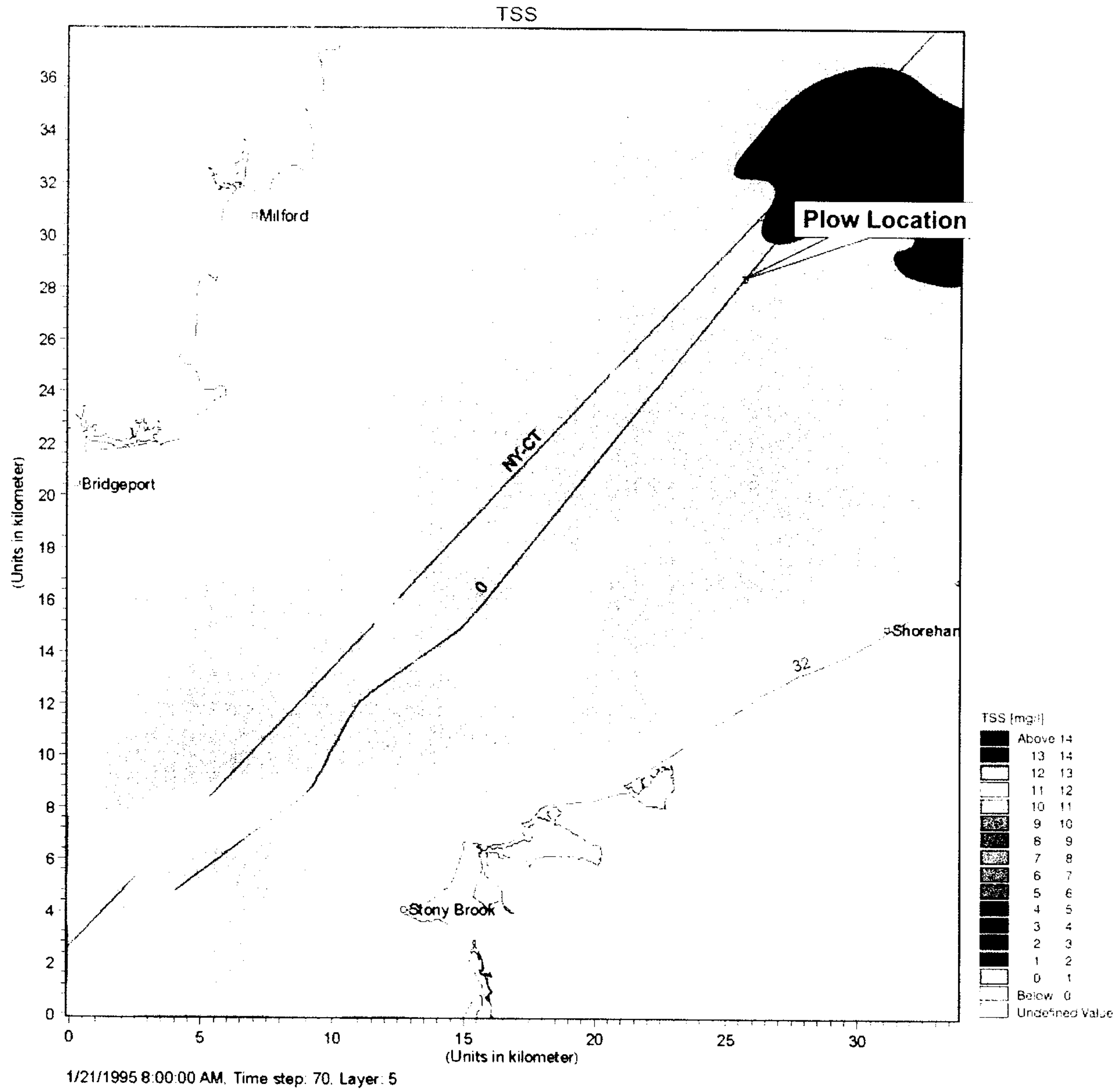

Figure 29 Mid-depth at Timestep = 70

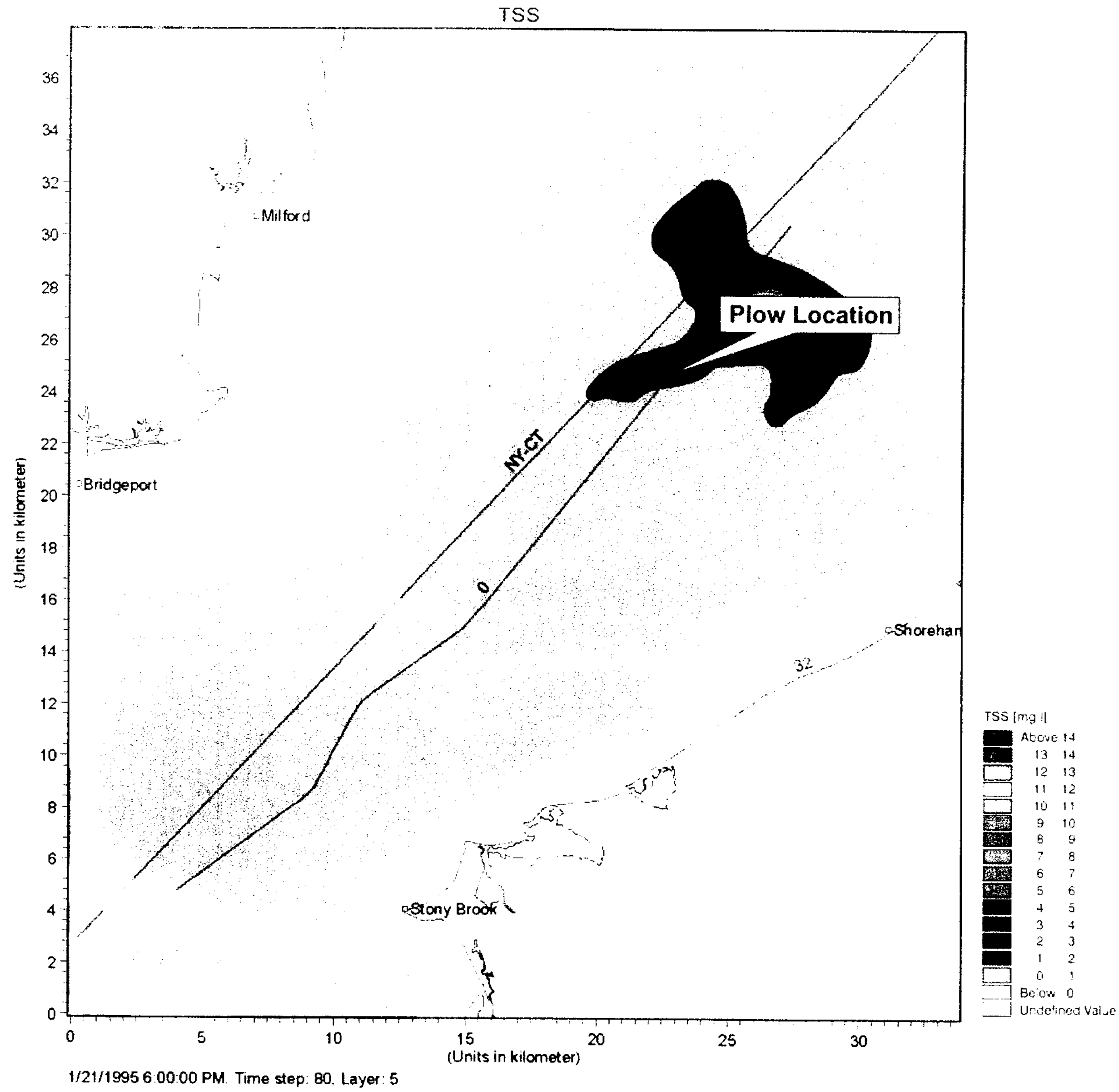

Figure 30 Mid-depth at Timestep = 80

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BW002764

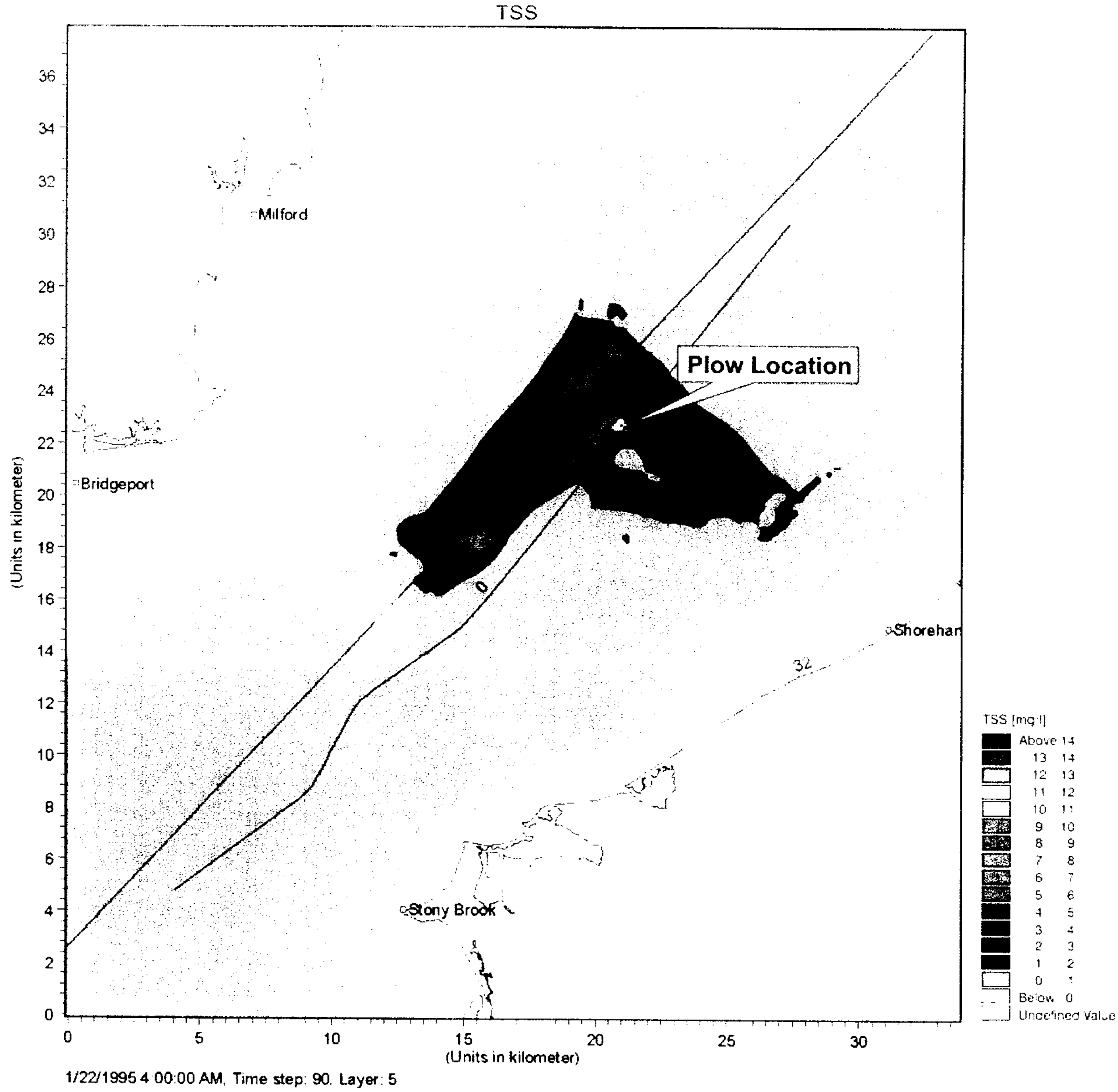
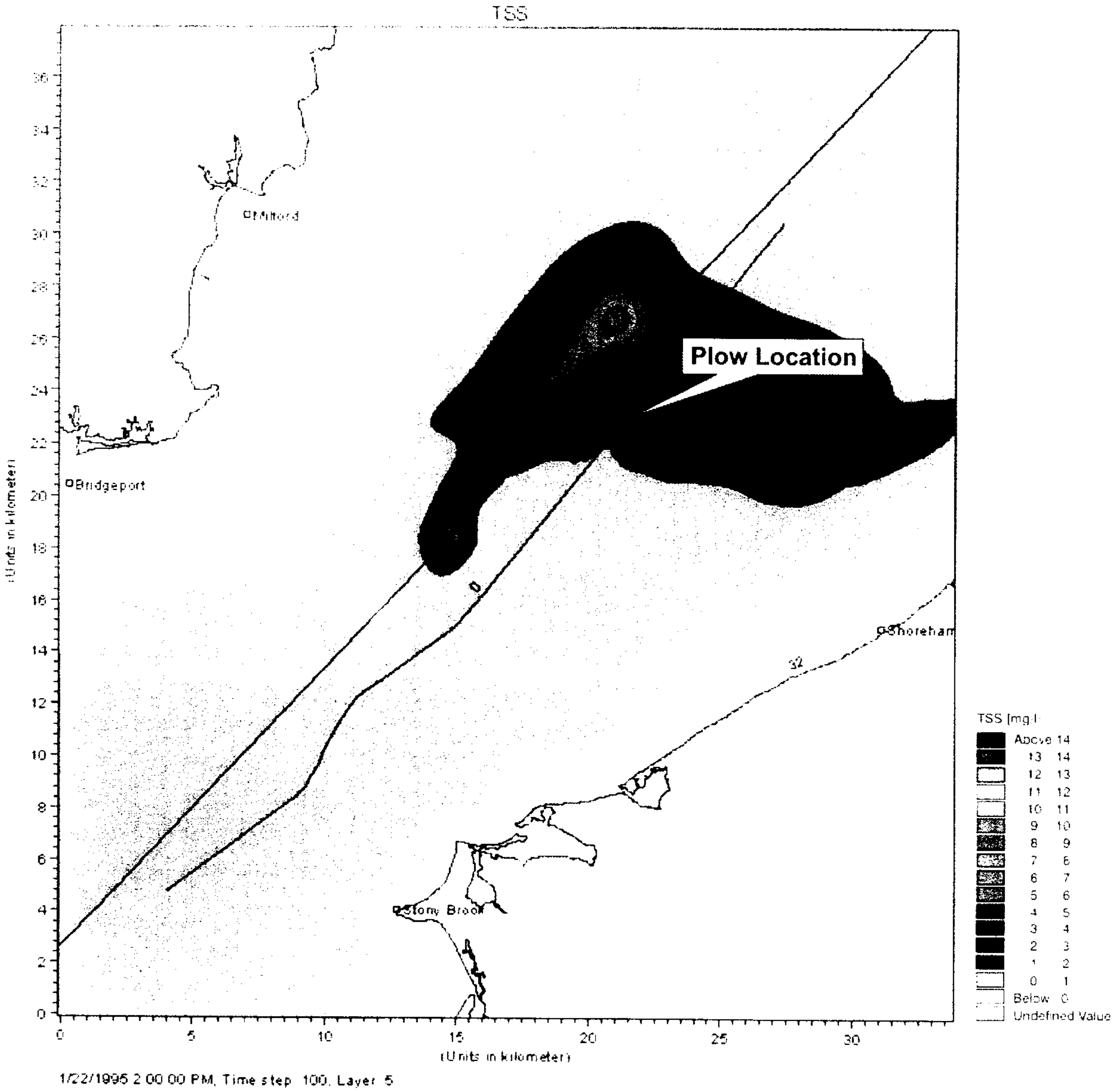


Figure 31 Mid-depth at Timestep = 90



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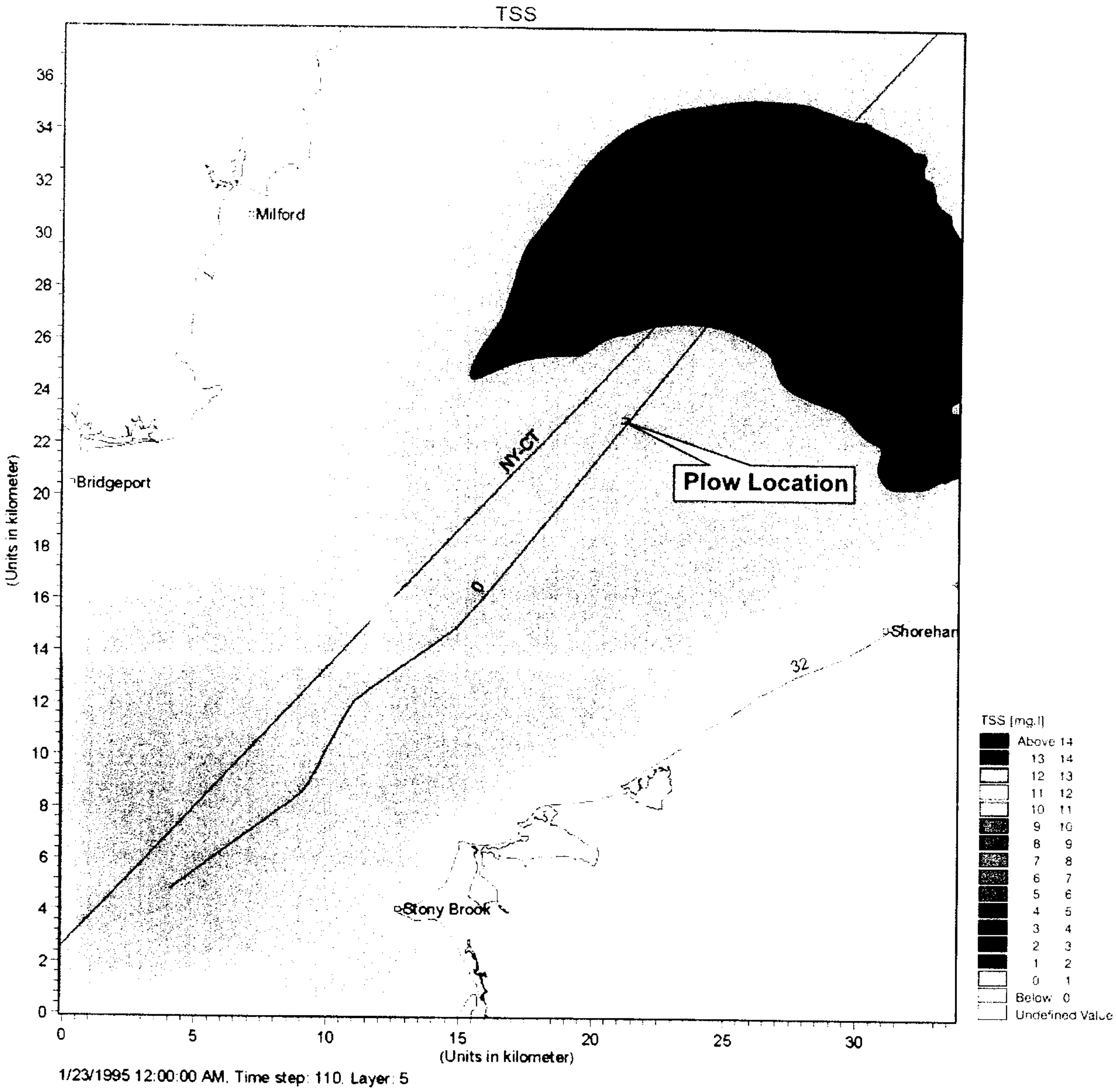

Figure 33 Mid-depth at Timestep = 110

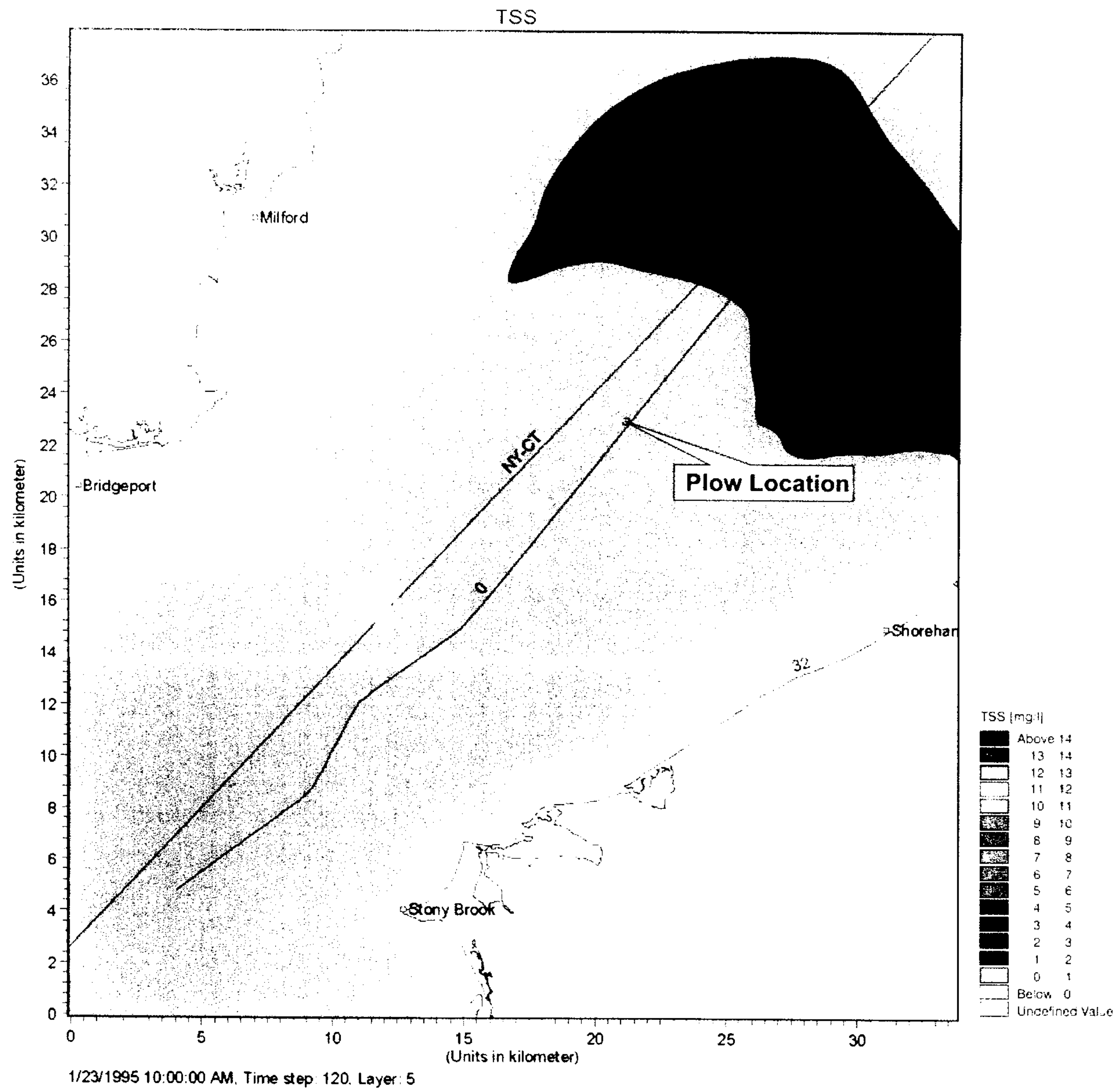

Figure 34 Mid-depth at Timestep = 120

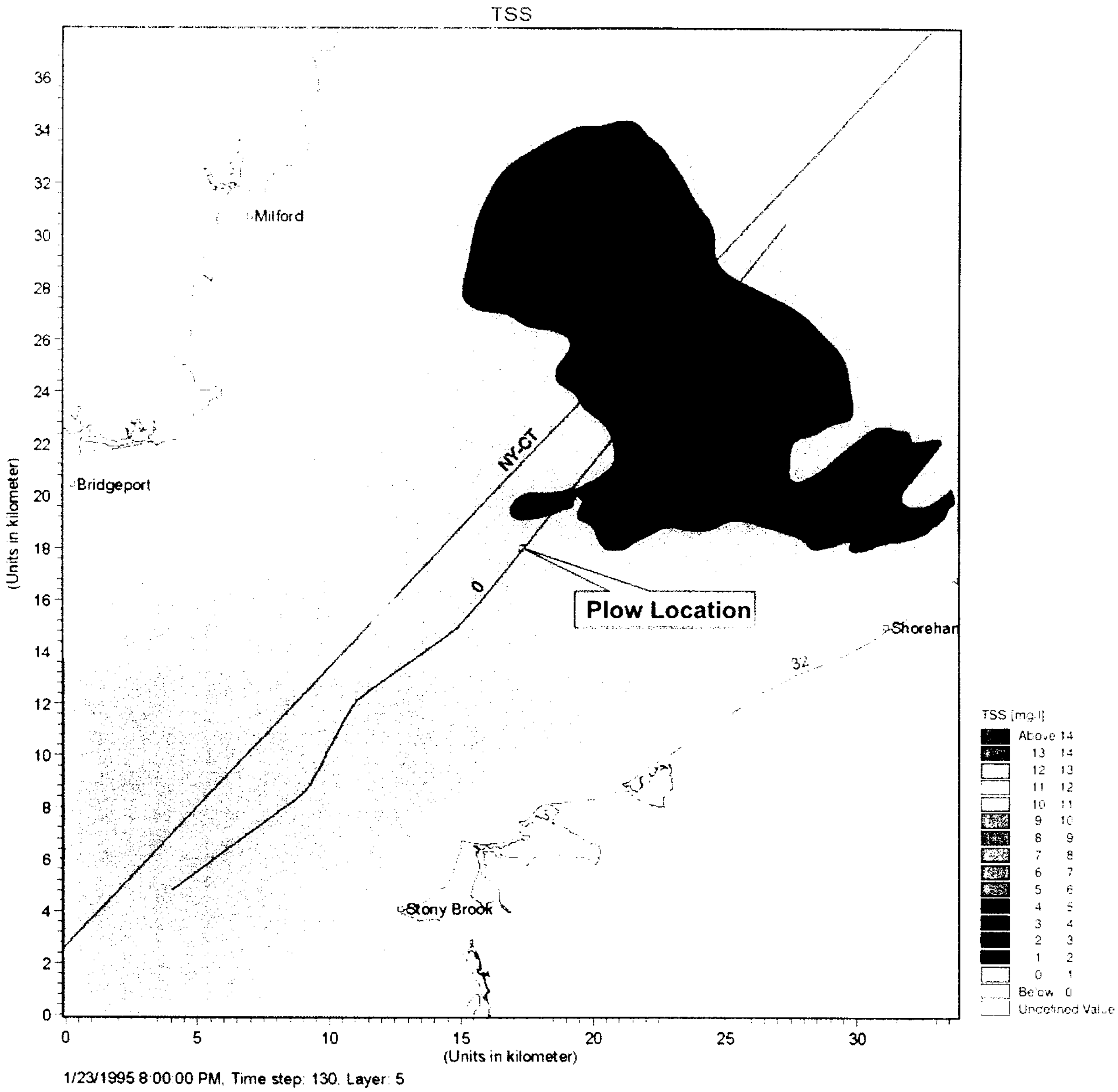

Figure 35 Mid-depth at Timestep = 130

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BW002769

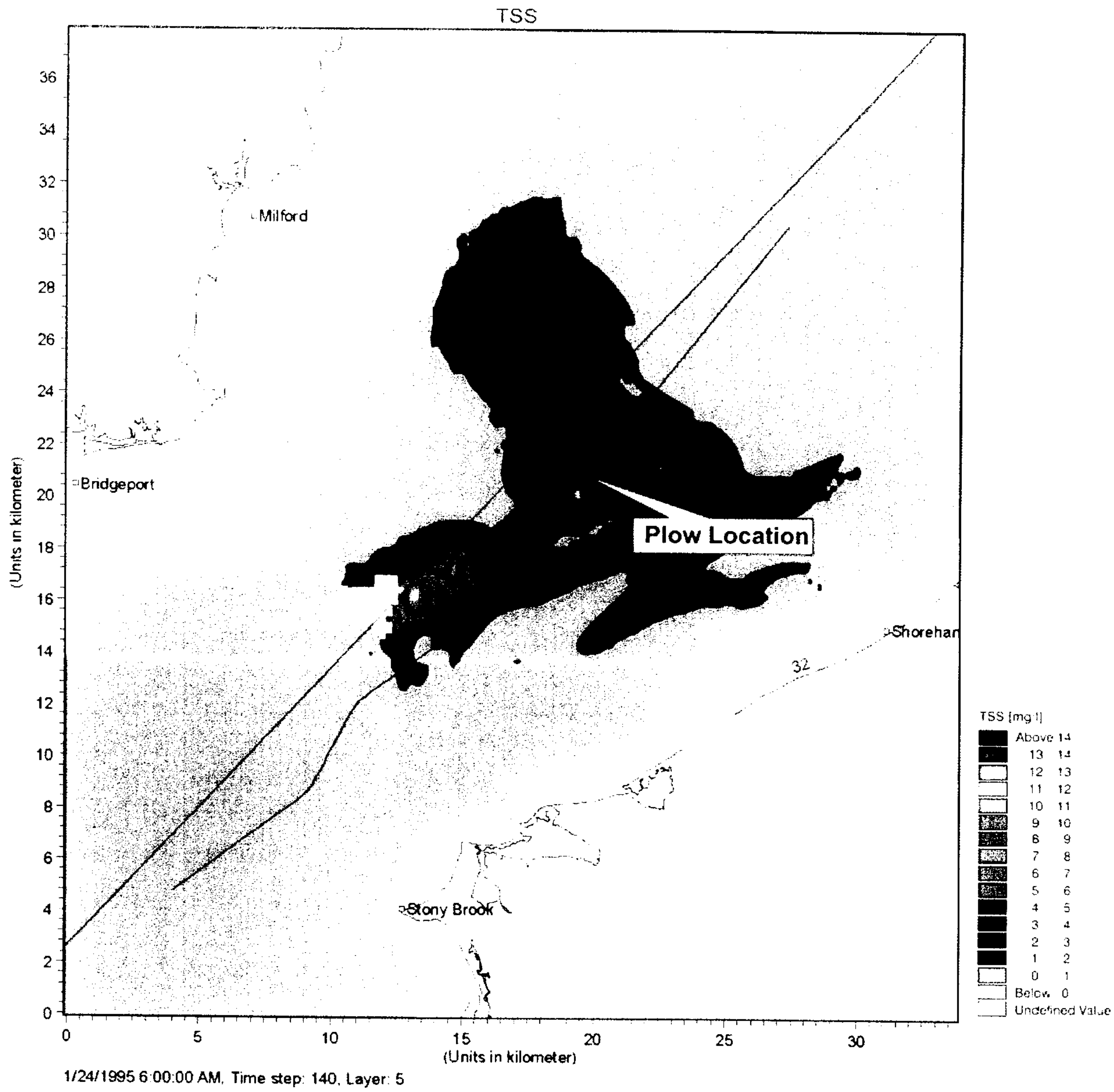

Figure 36 Mid-depth at Timestep = 140

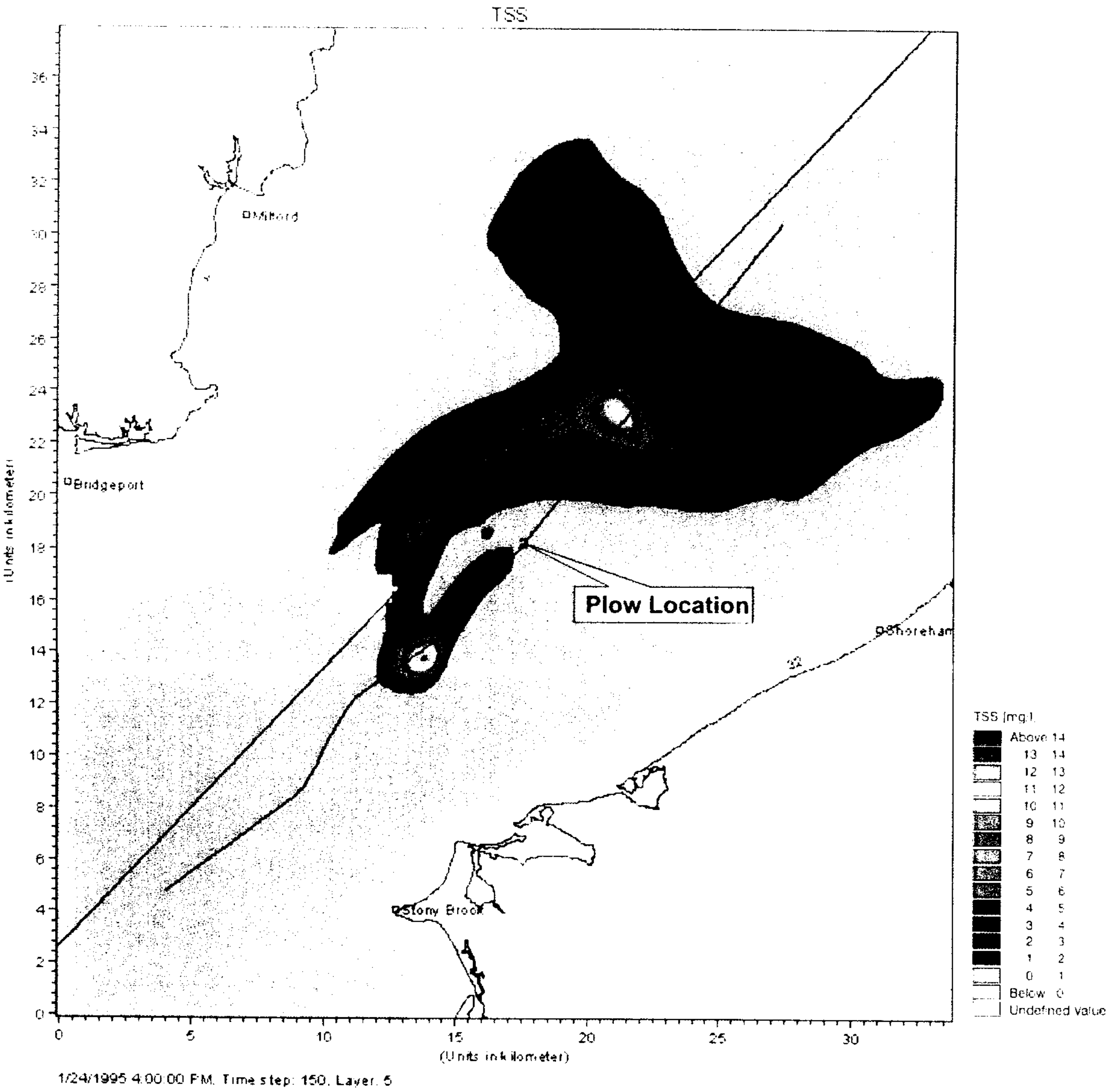

Figure 37 Mid-depth at Timestep = 150

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BW002771

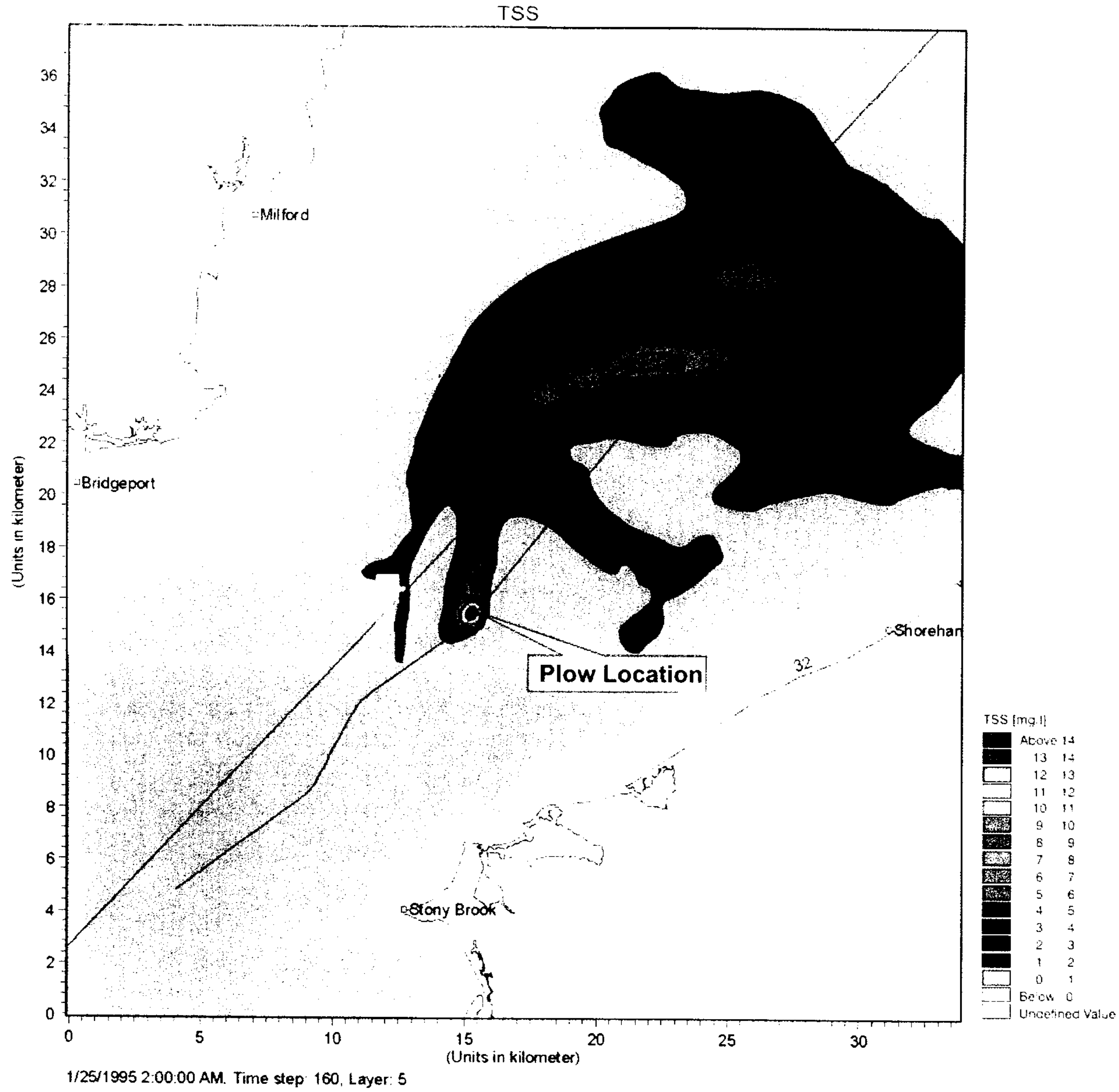


Figure 38 Mid-depth at Timestep = 160

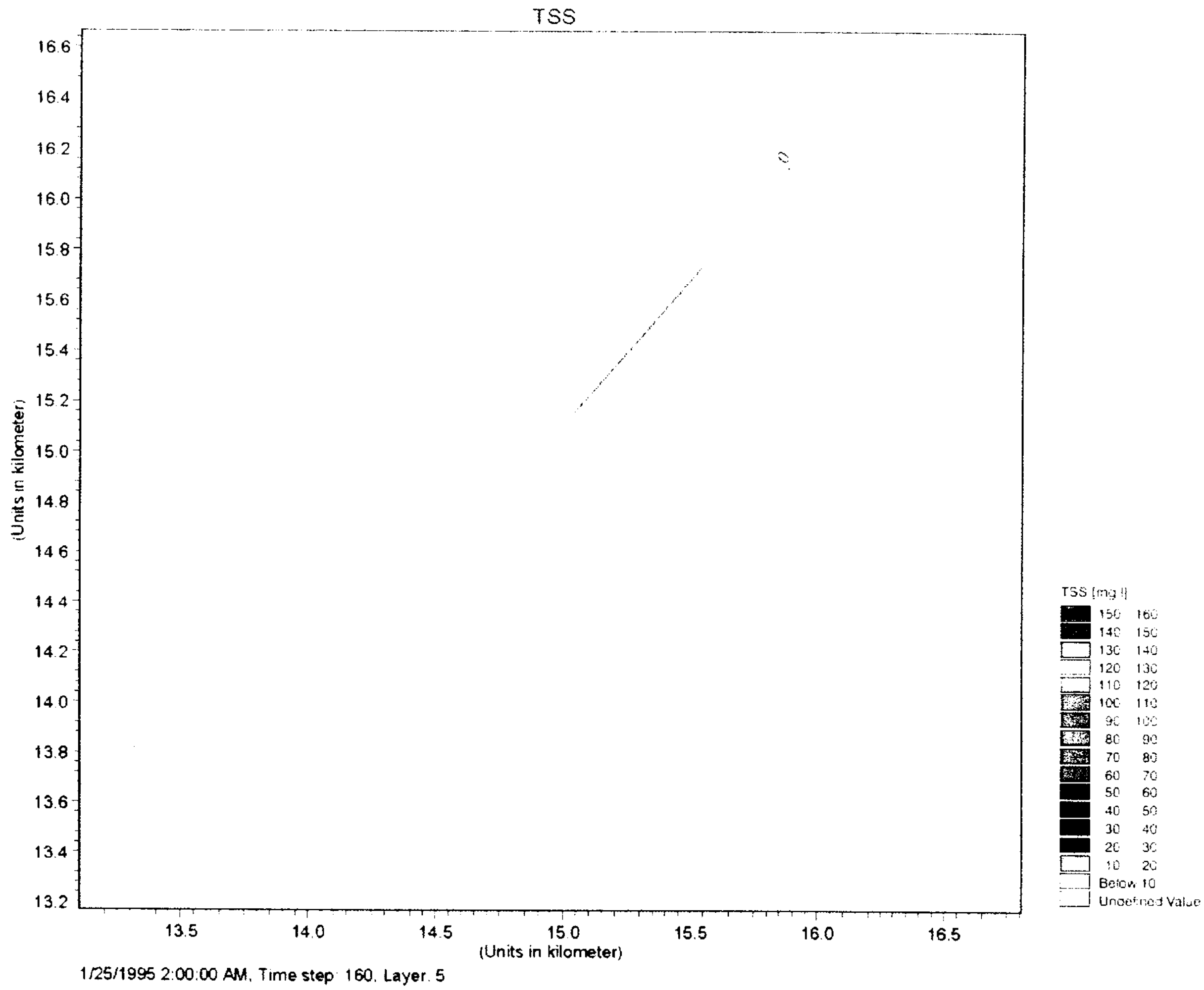


Figure 38A Mid-depth at Timestep = 160 (expanded scale)

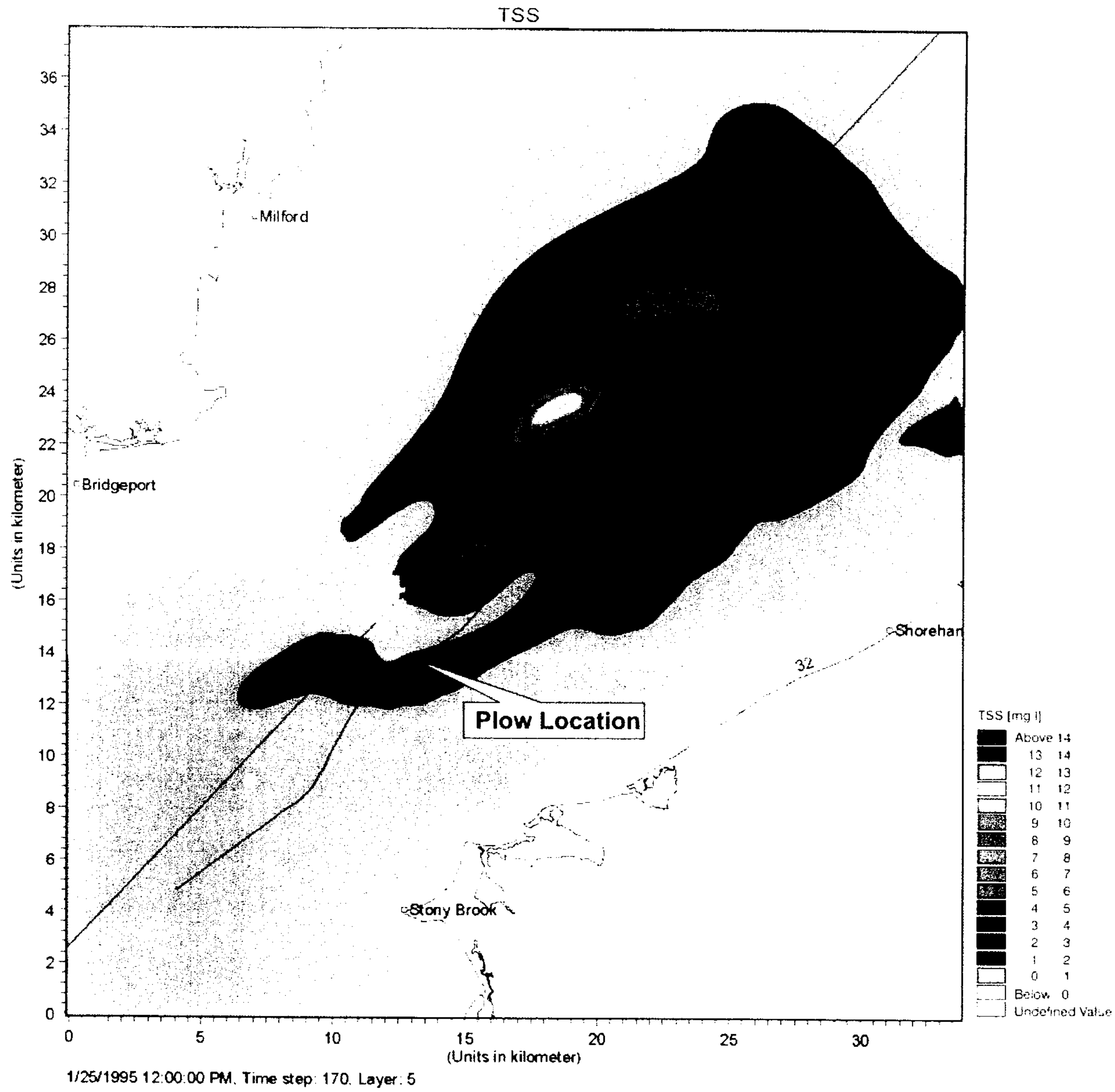
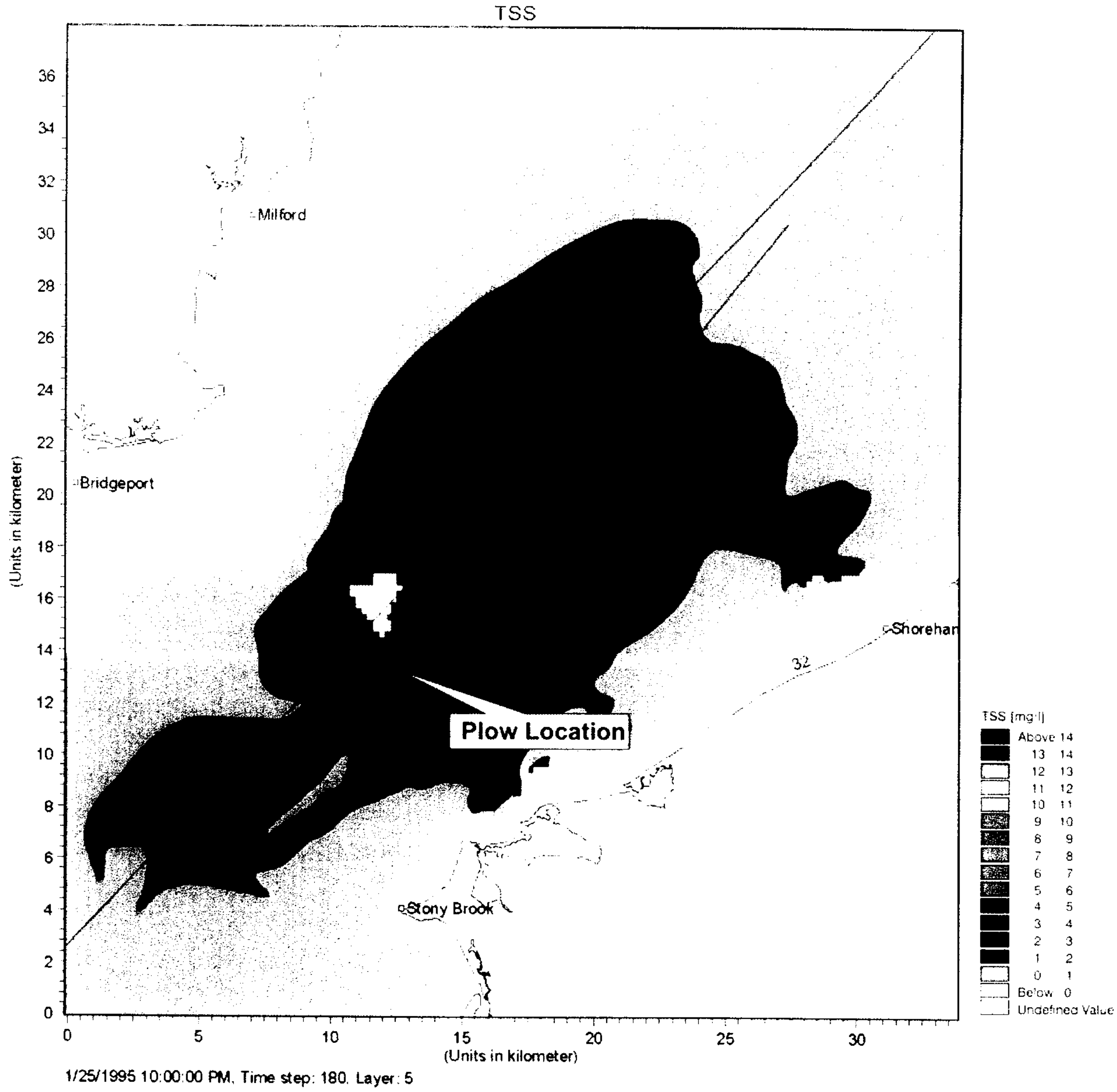


Figure 39 Mid-depth at Timestep = 170



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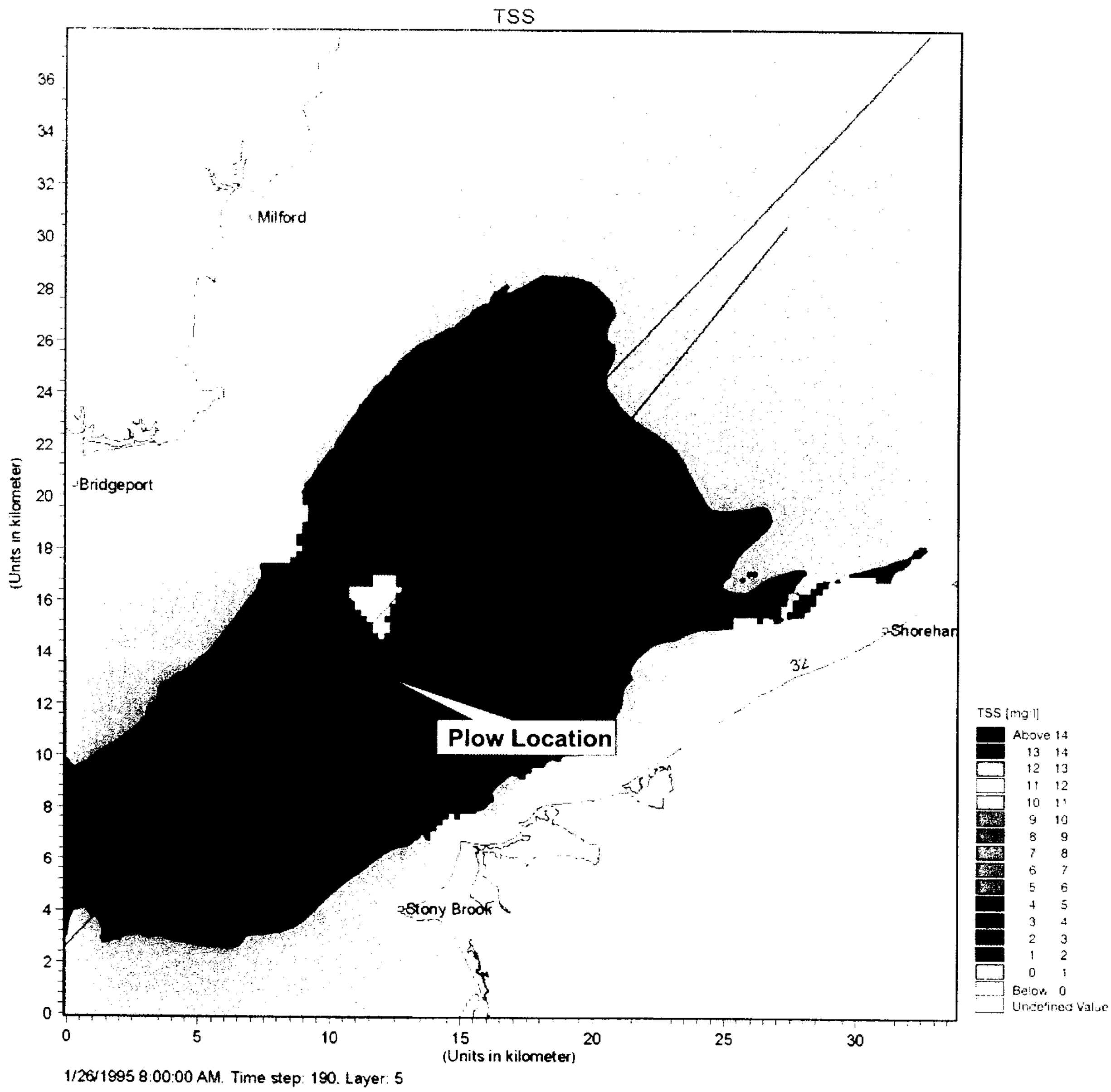

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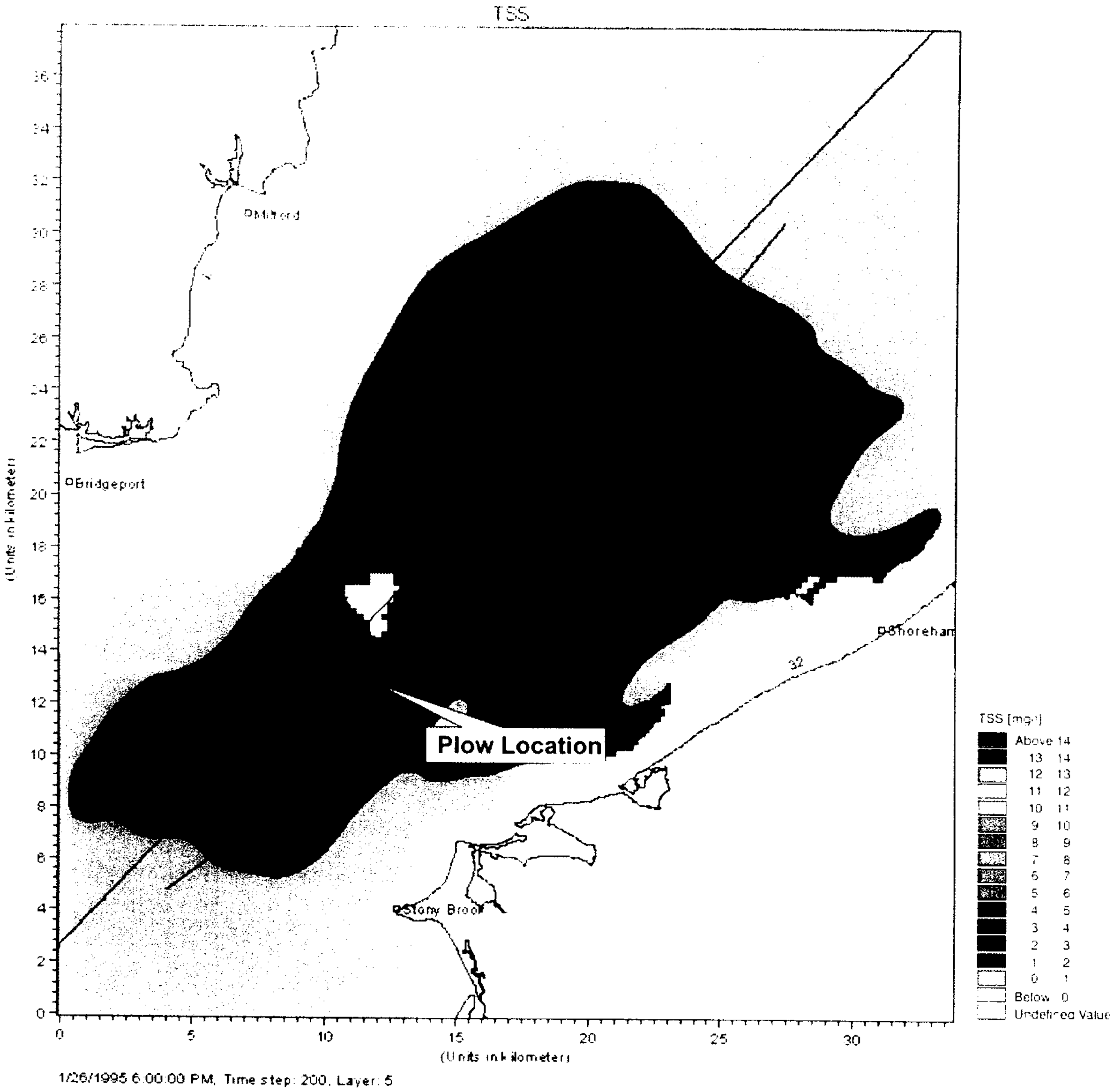
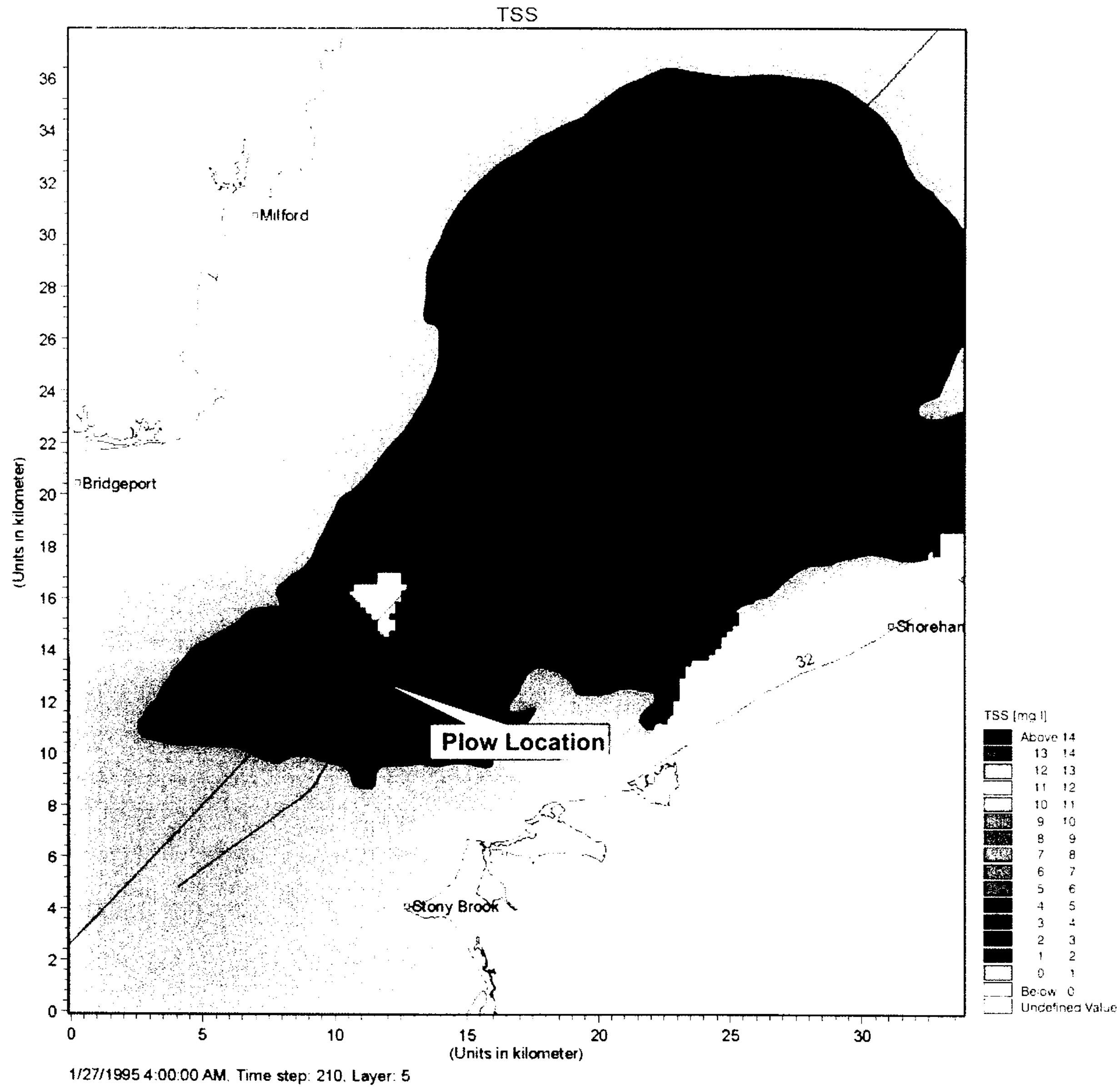


Figure 42 Mid-depth at Timestep = 200



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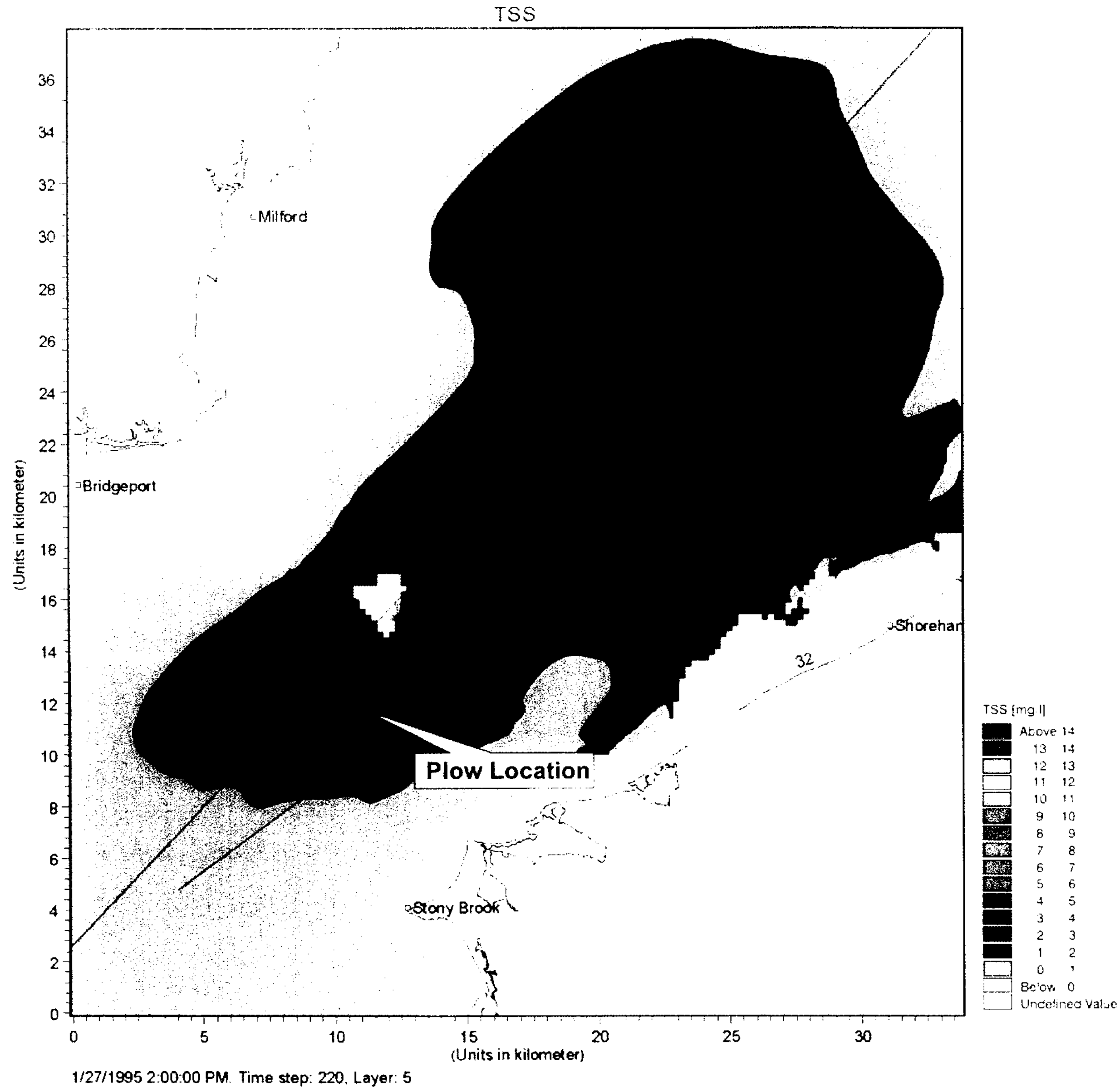

Figure 44 Mid-depth at Timestep = 220

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BW002779

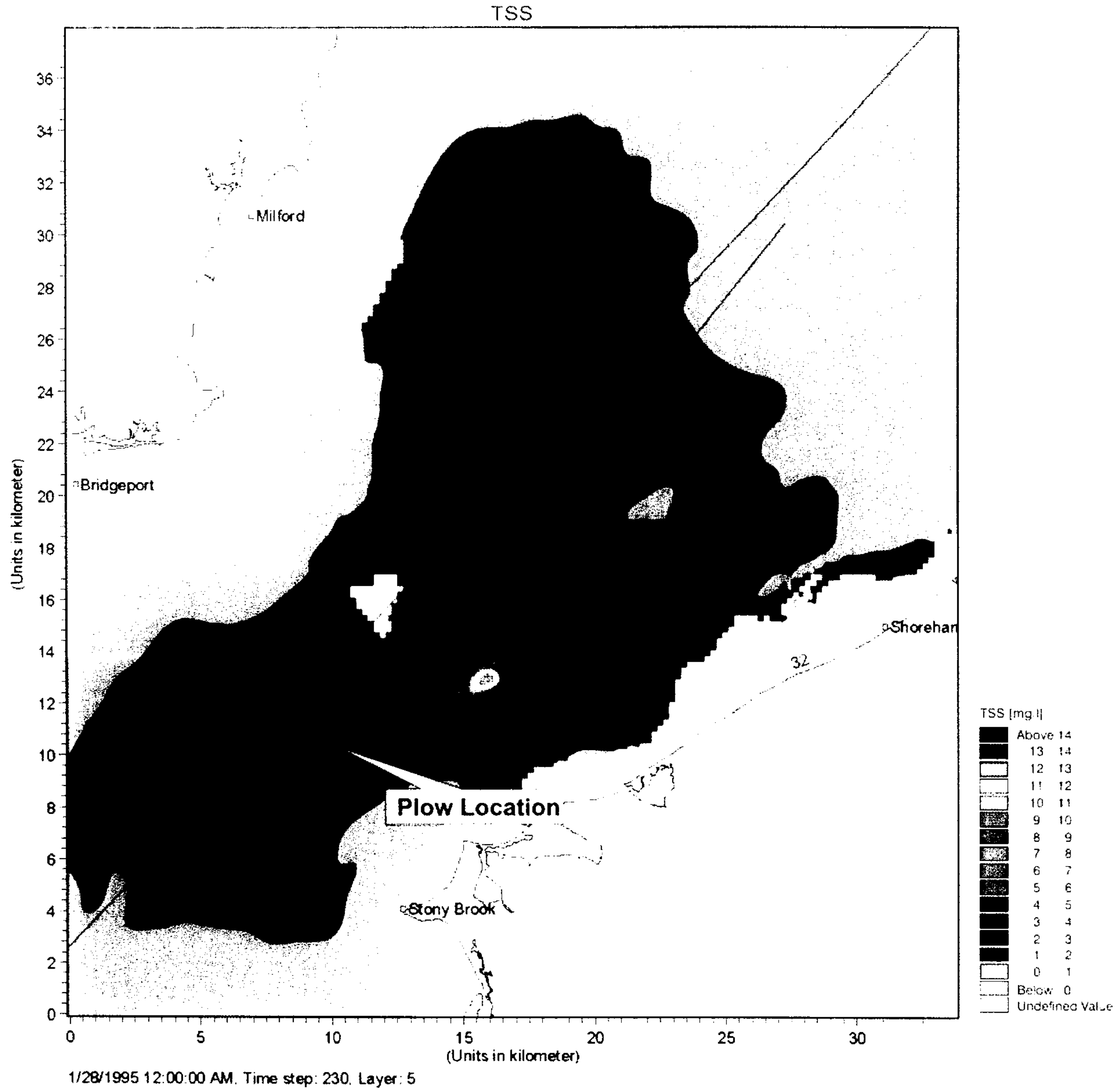

Figure 45 Mid-depth at Timestep = 230

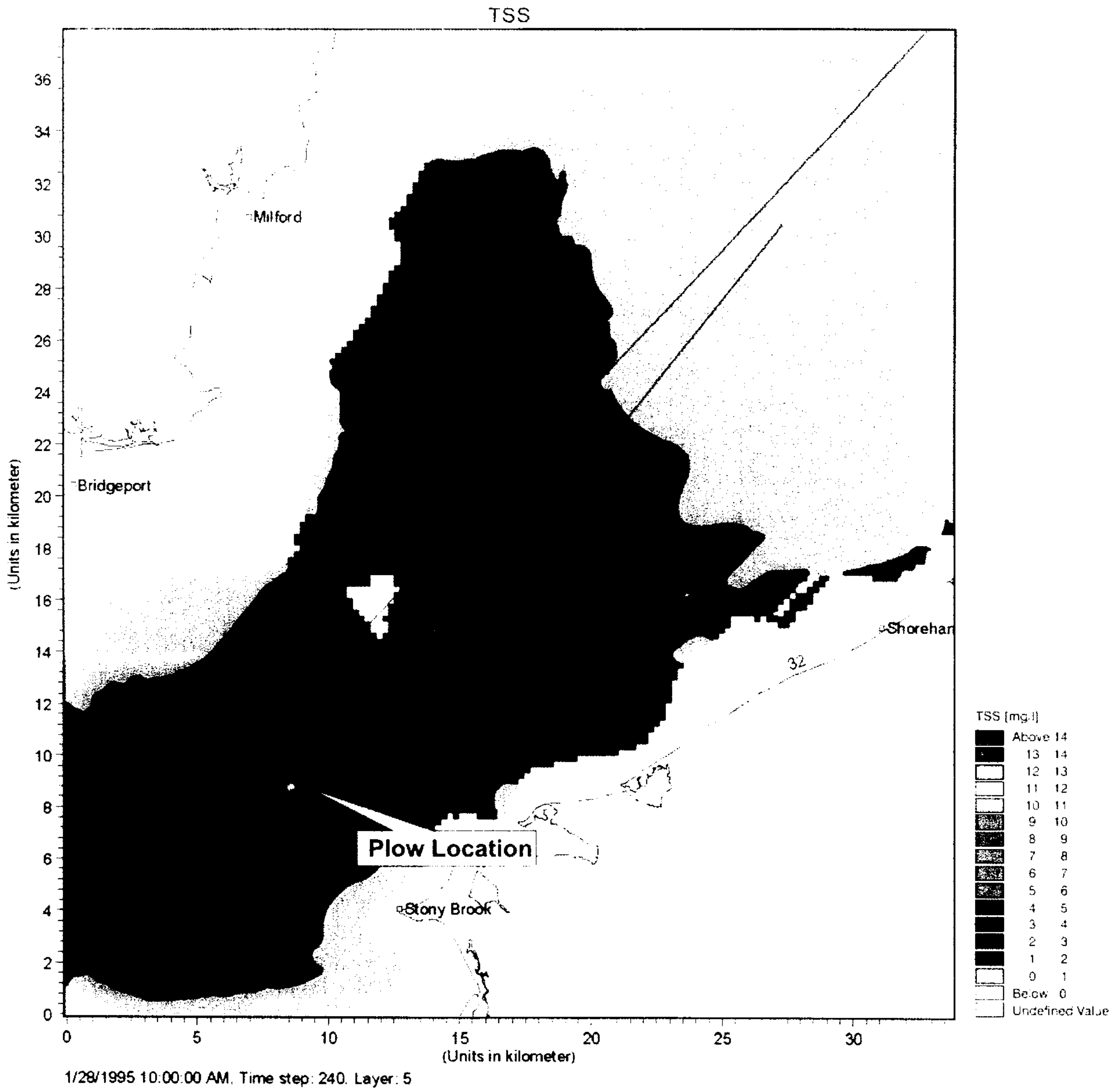

Figure 46 Mid-depth at Timestep = 240

PUBLIC

BW002781

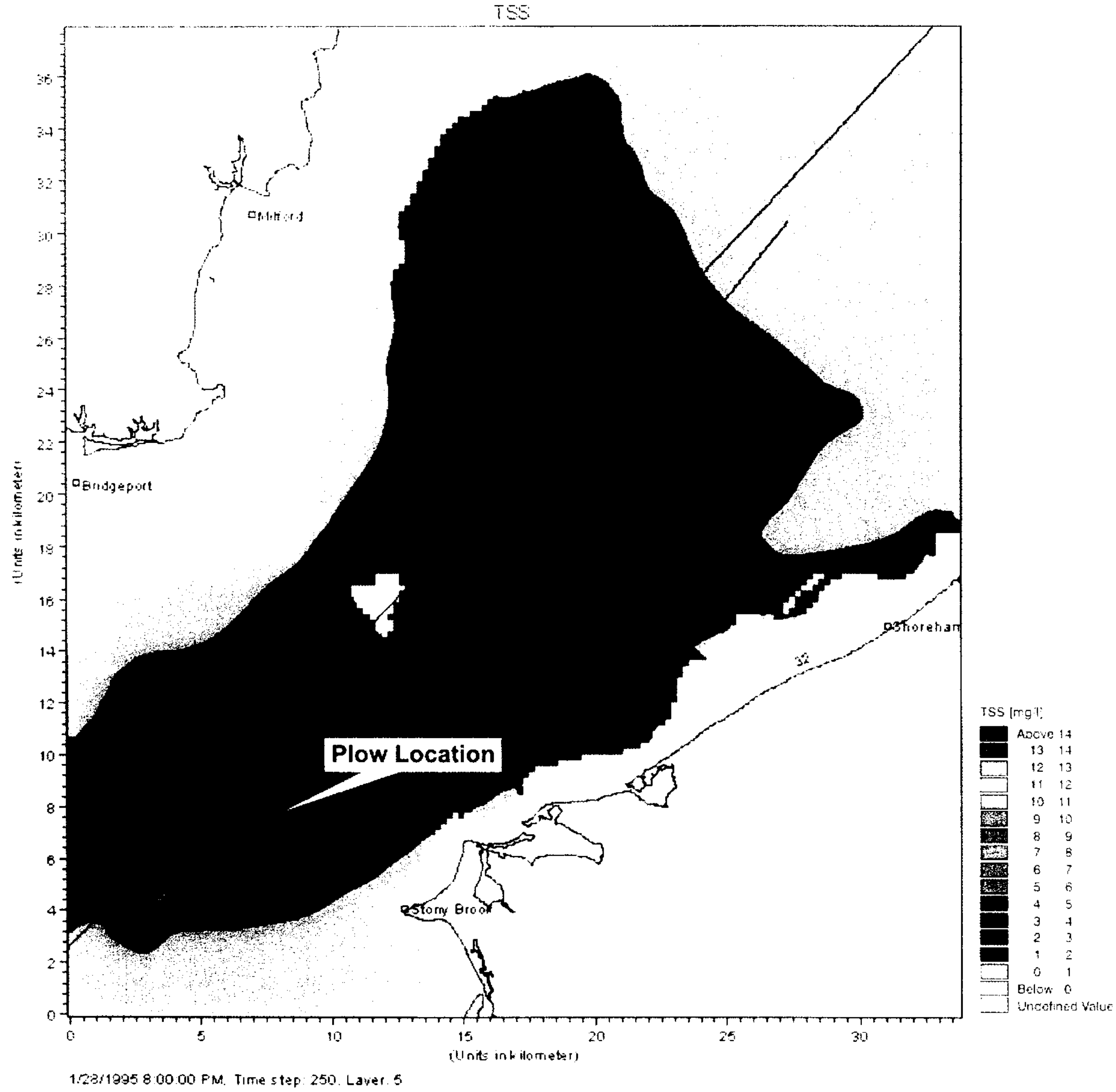

Figure 47 Mid-depth at Timestep = 250

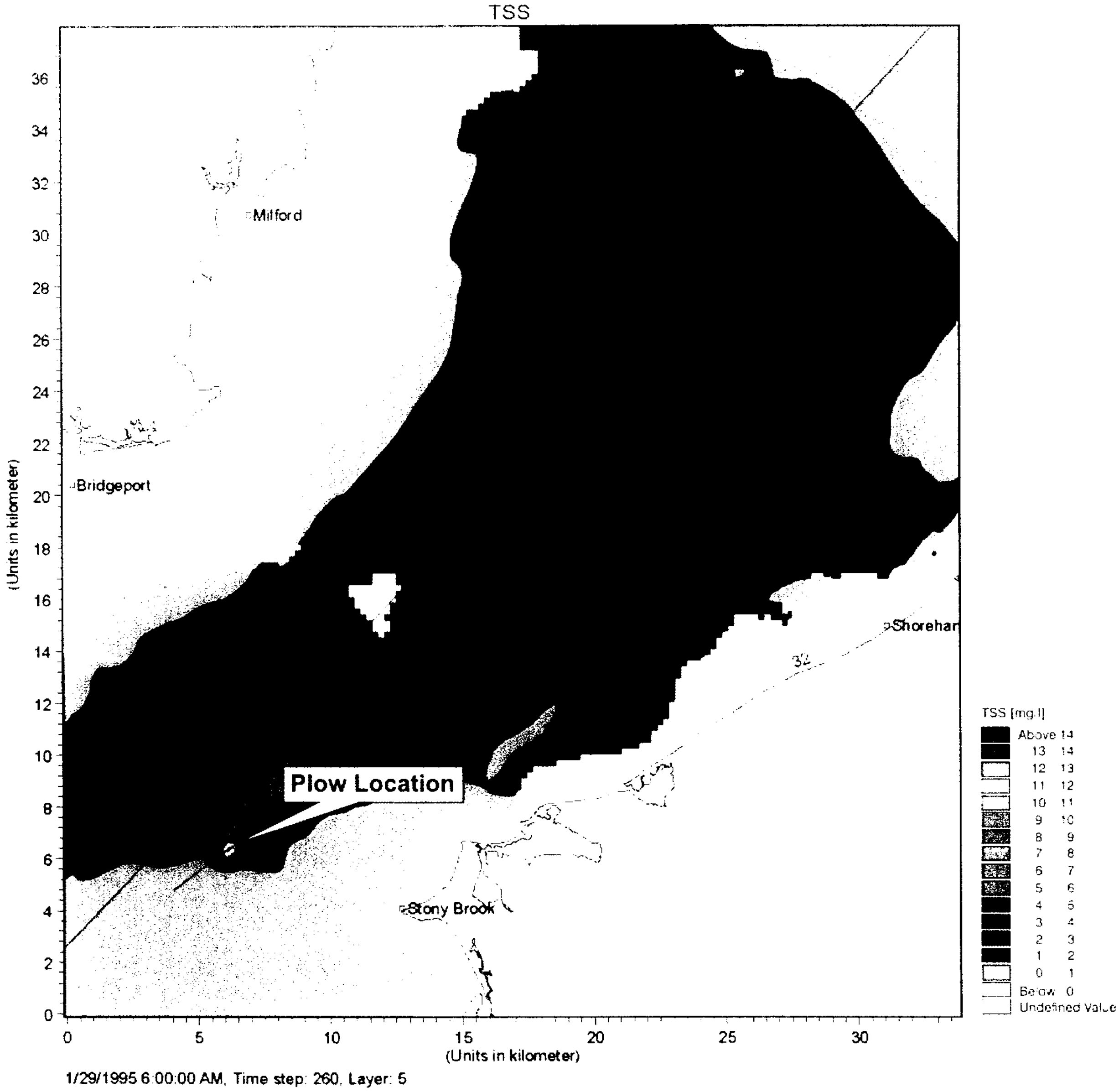

Figure 48 Mid-depth at Timestep = 260

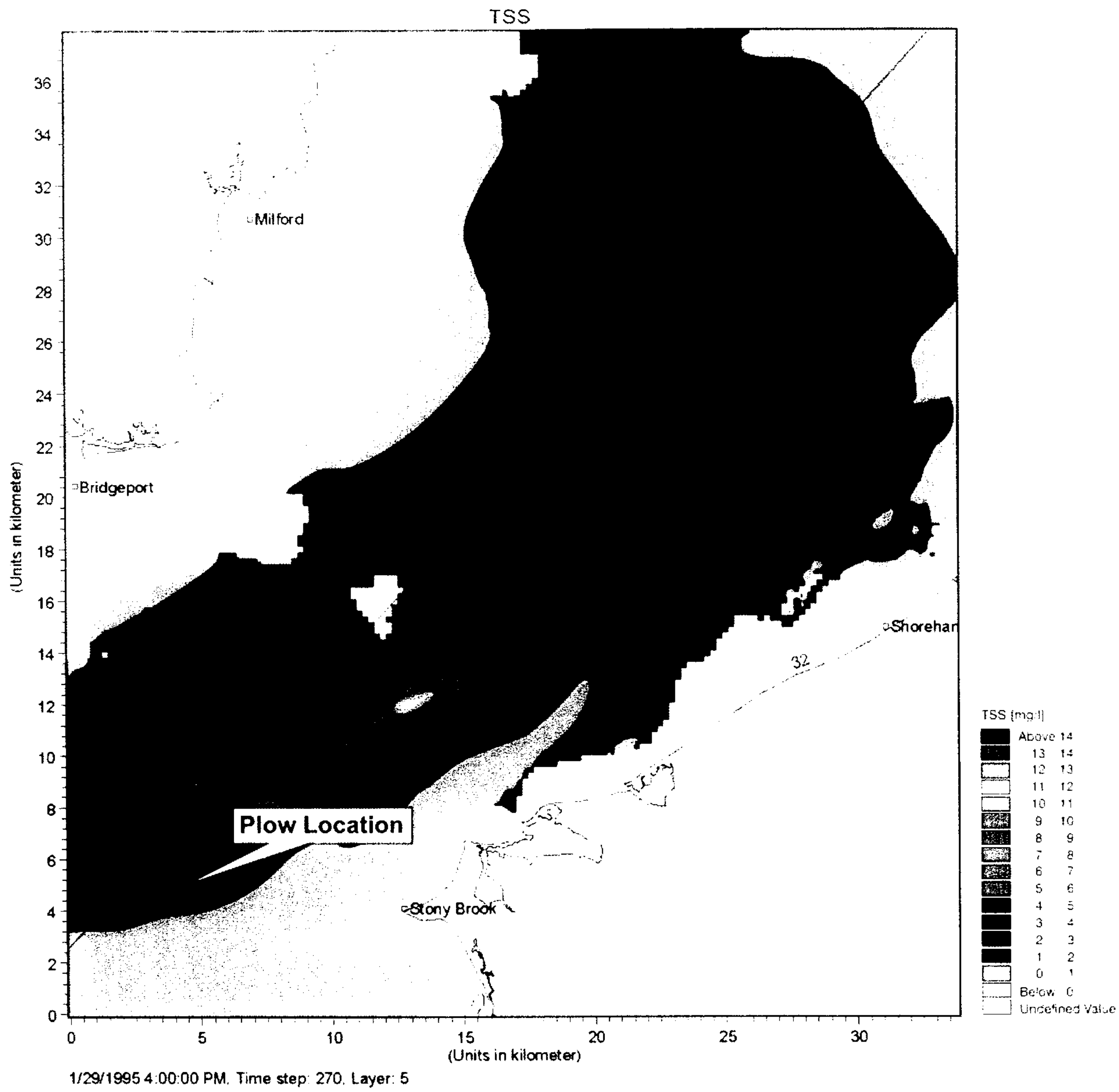

Figure 49 Mid-depth at Timestep = 270

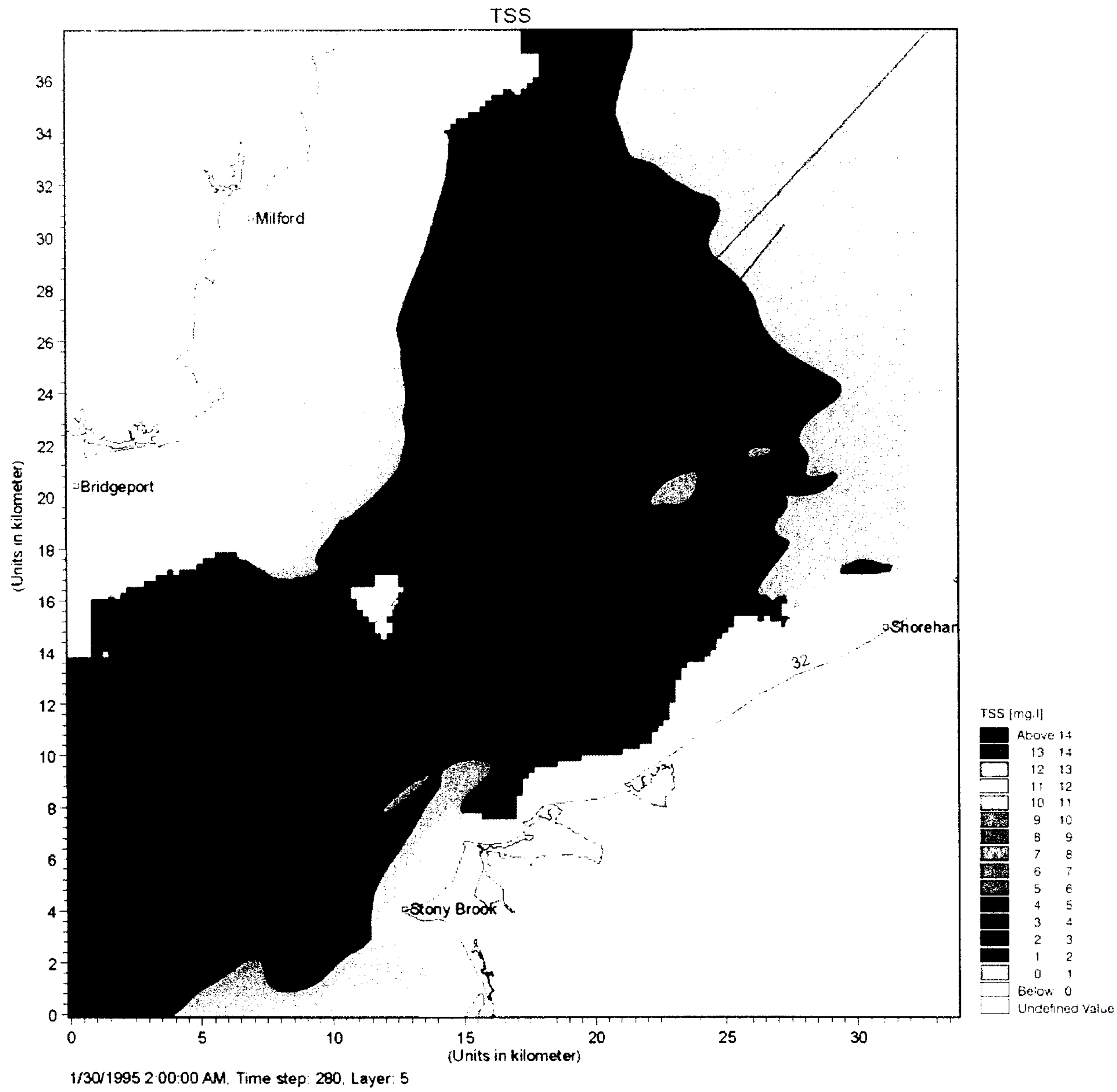

Figure 50 Mid-depth at Timestep = 280 (8 hours after end of plowing)

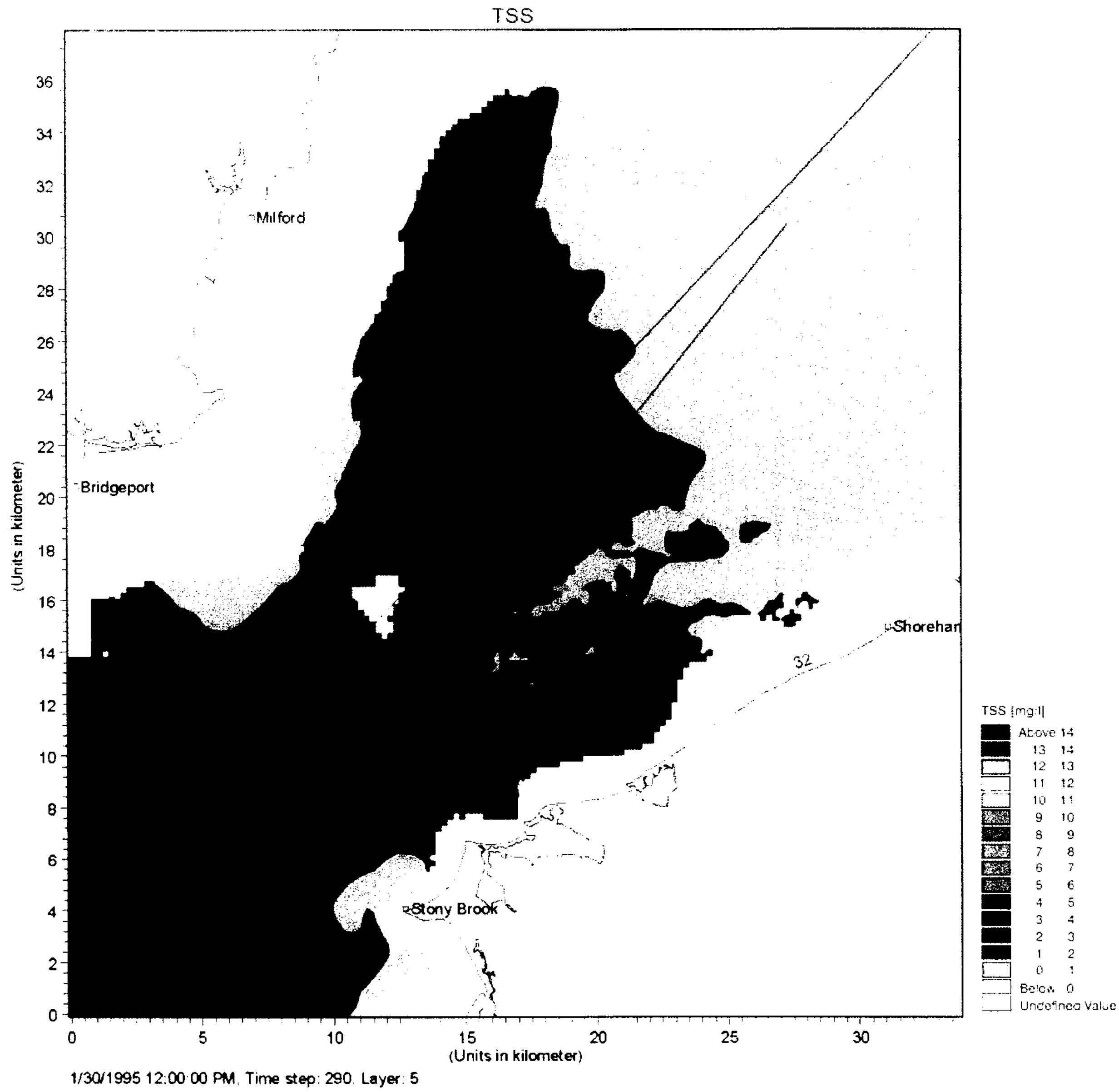

Figure 51 **Mid-depth at Timestep = 290 (18 hours after end of plowing)**

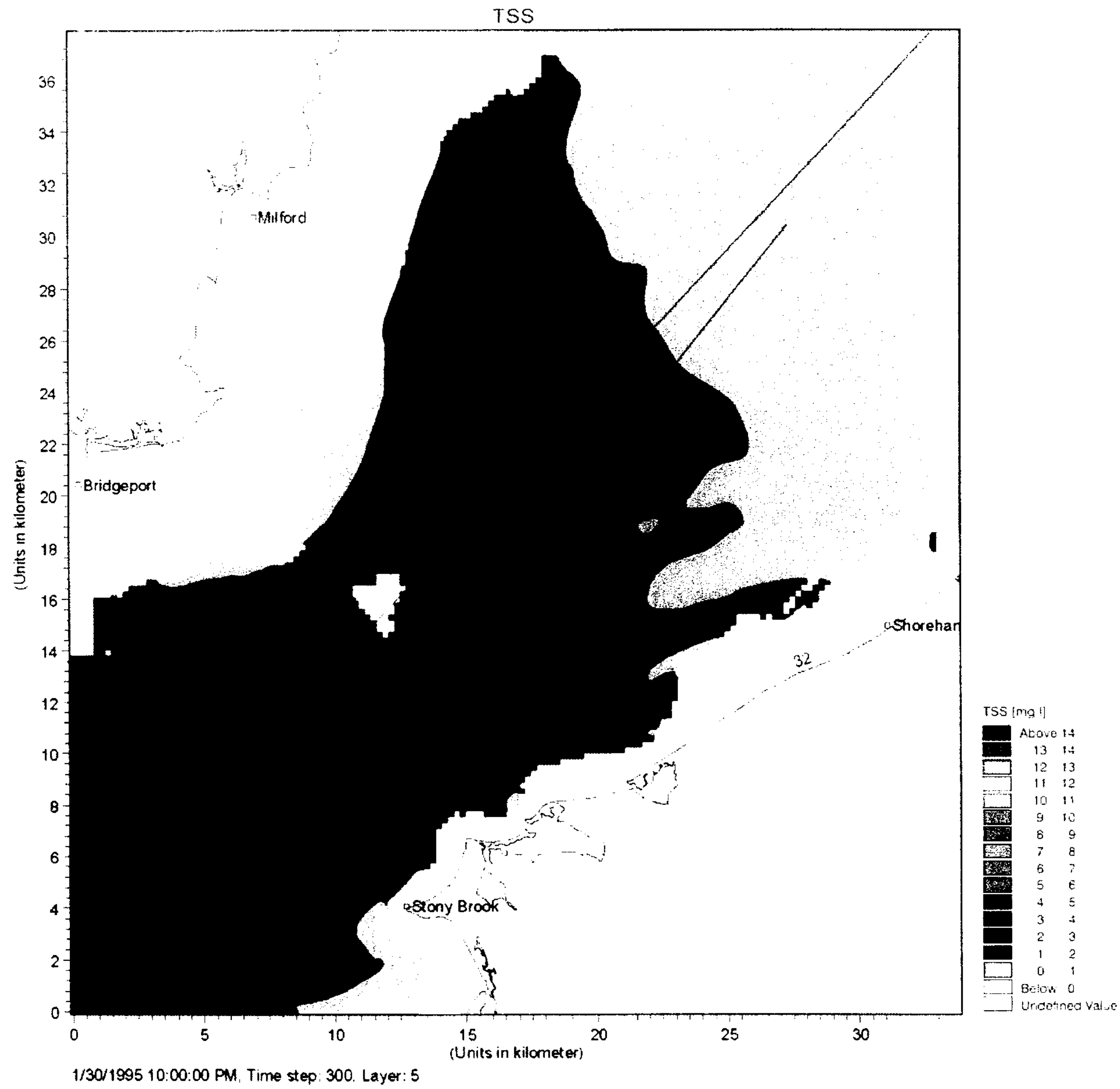

Figure 52 Mid-depth at Timestep = 300 (28 hours after end of plowing)

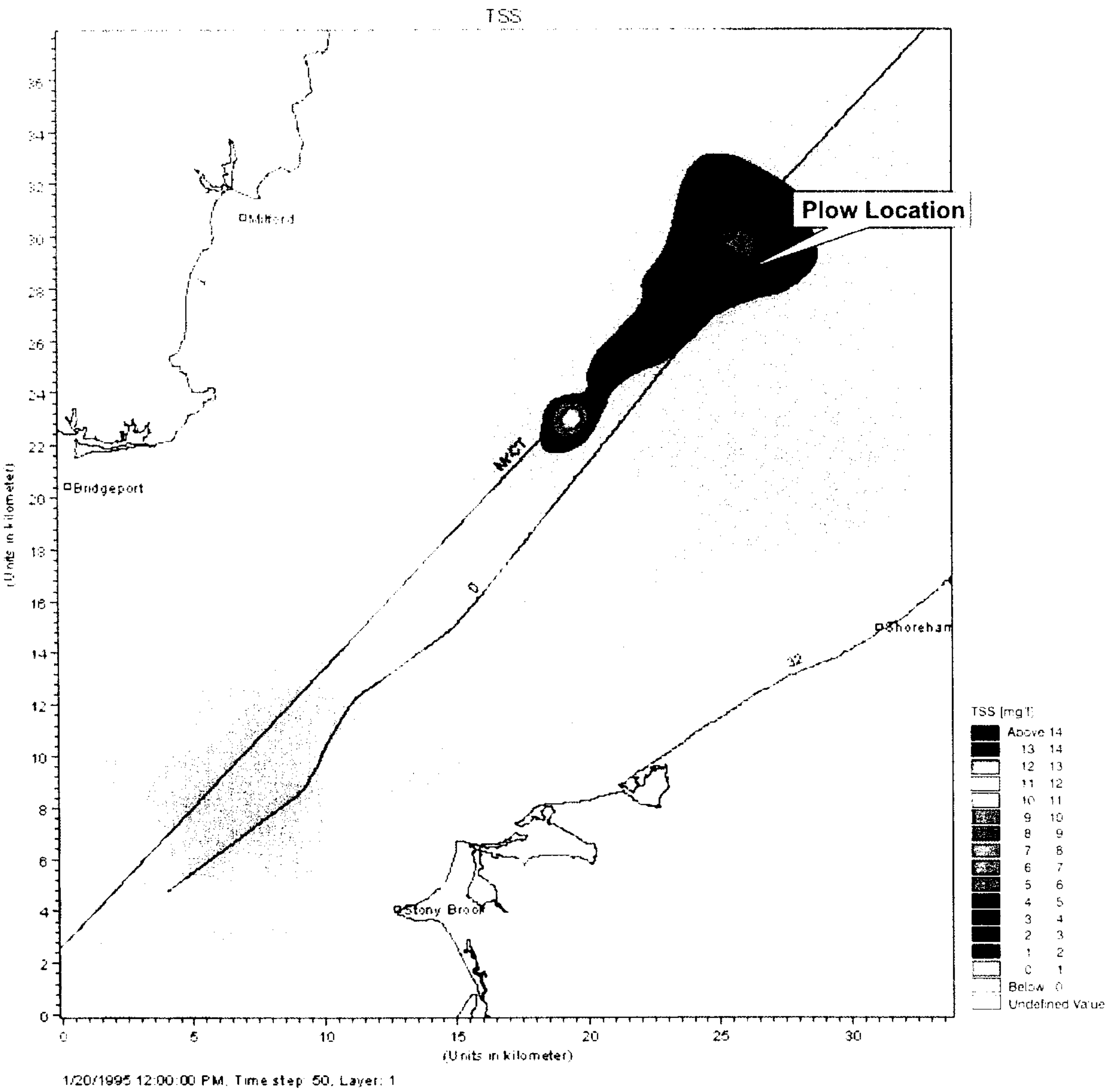

Figure 53 Bottom at Timestep = 50

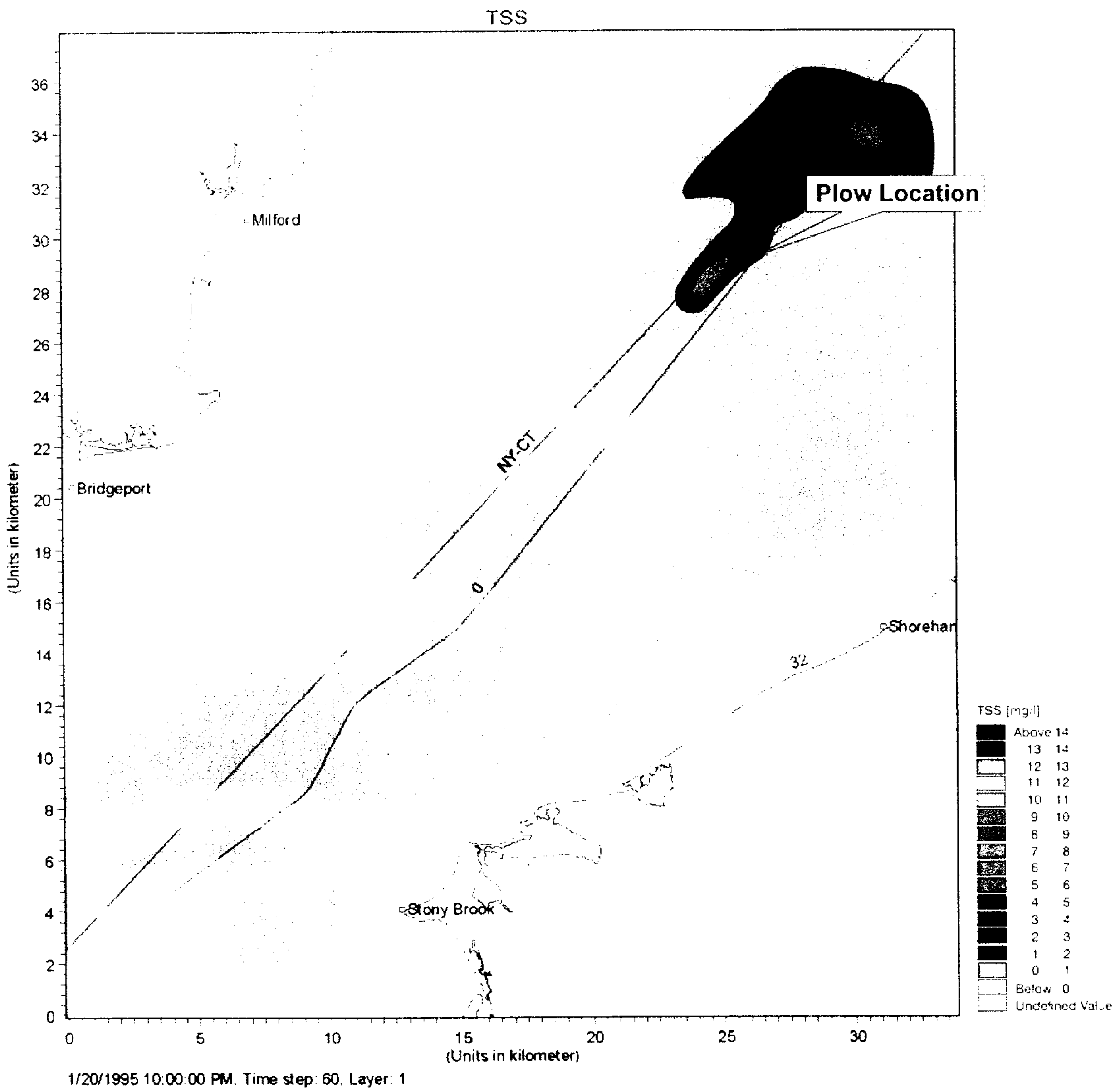

Figure 54 Bottom at Timestep = 60

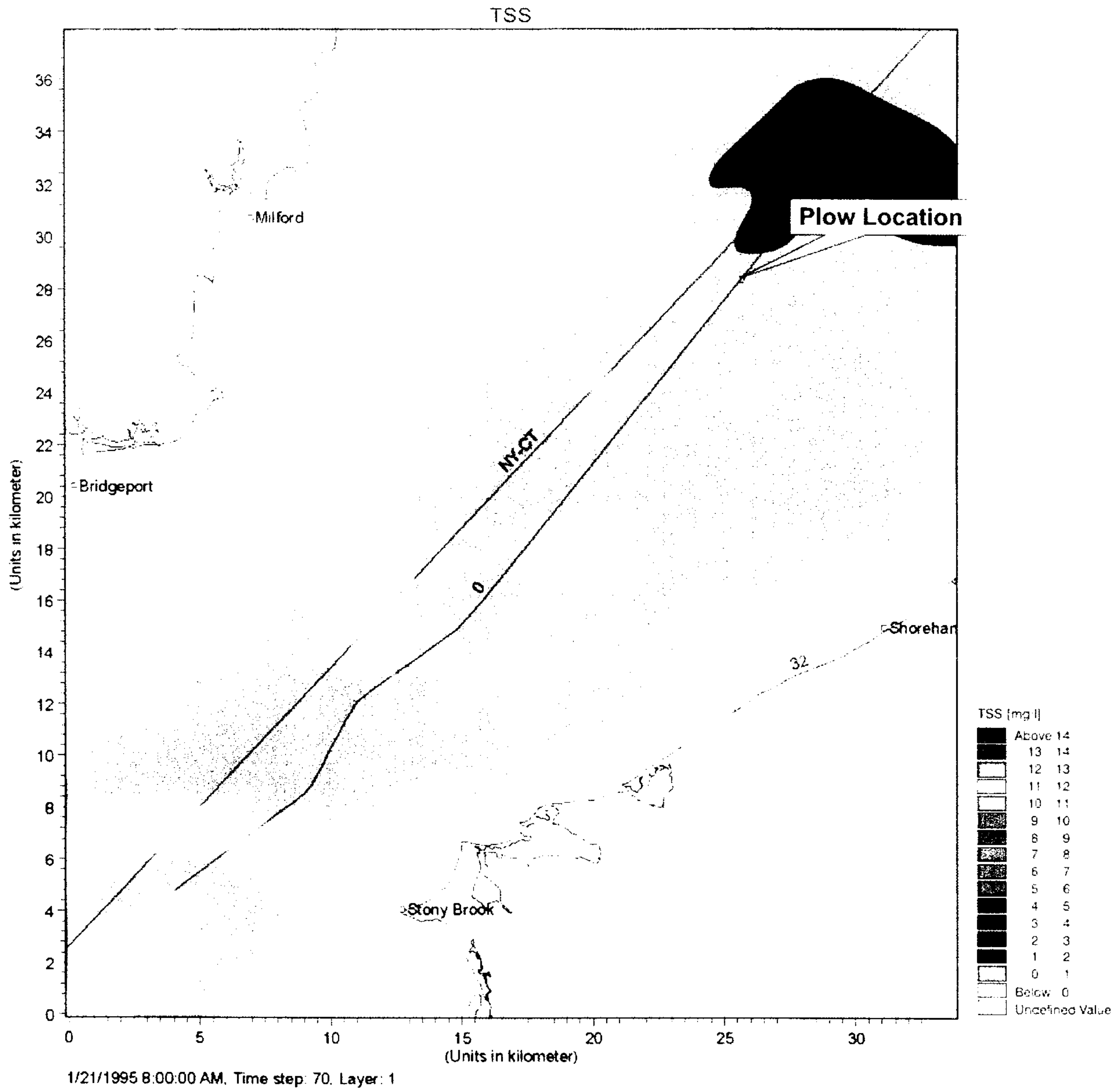

Figure 55 Bottom at Timestep = 70

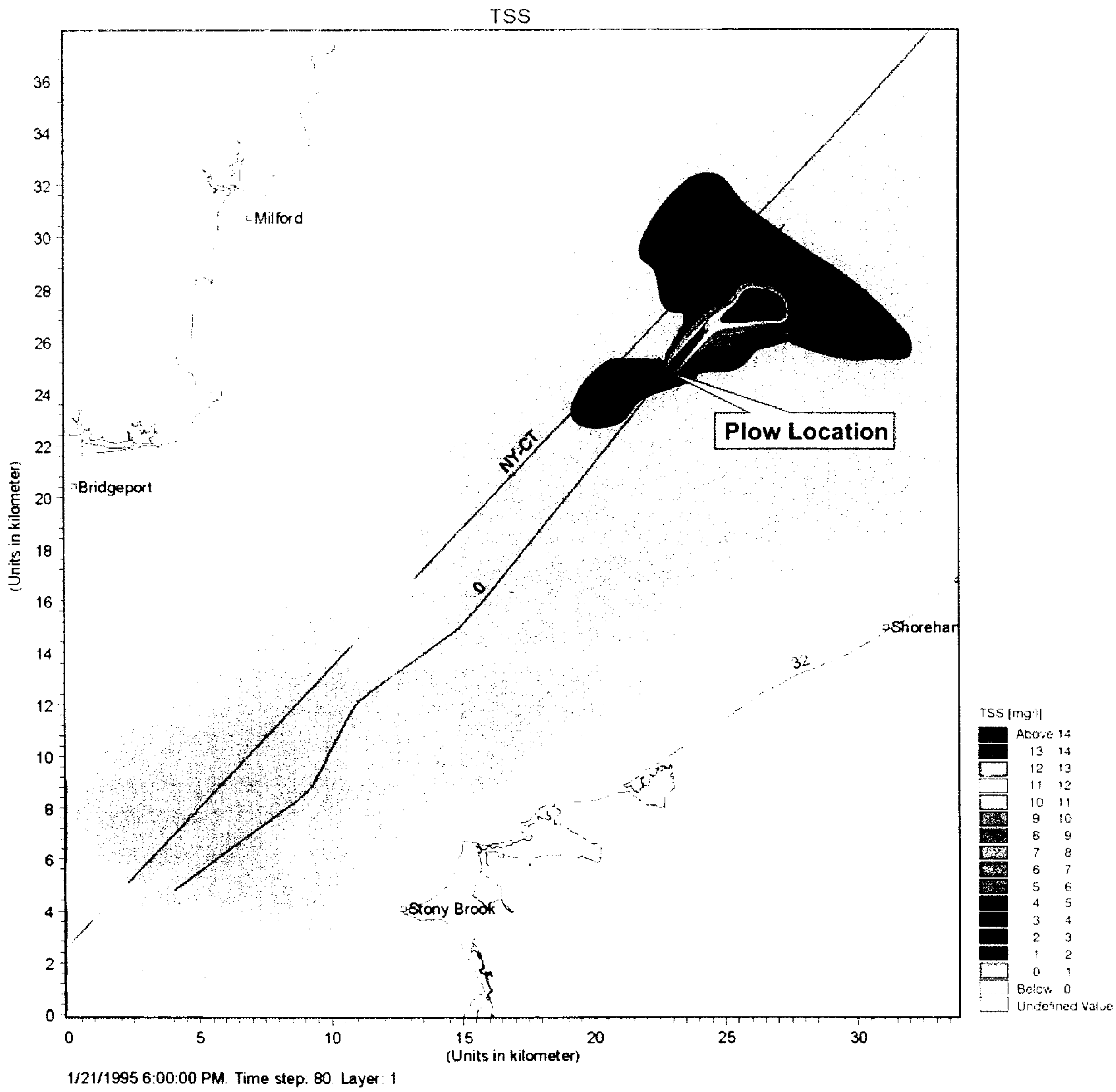

Figure 56 Bottom at Timestep = 80

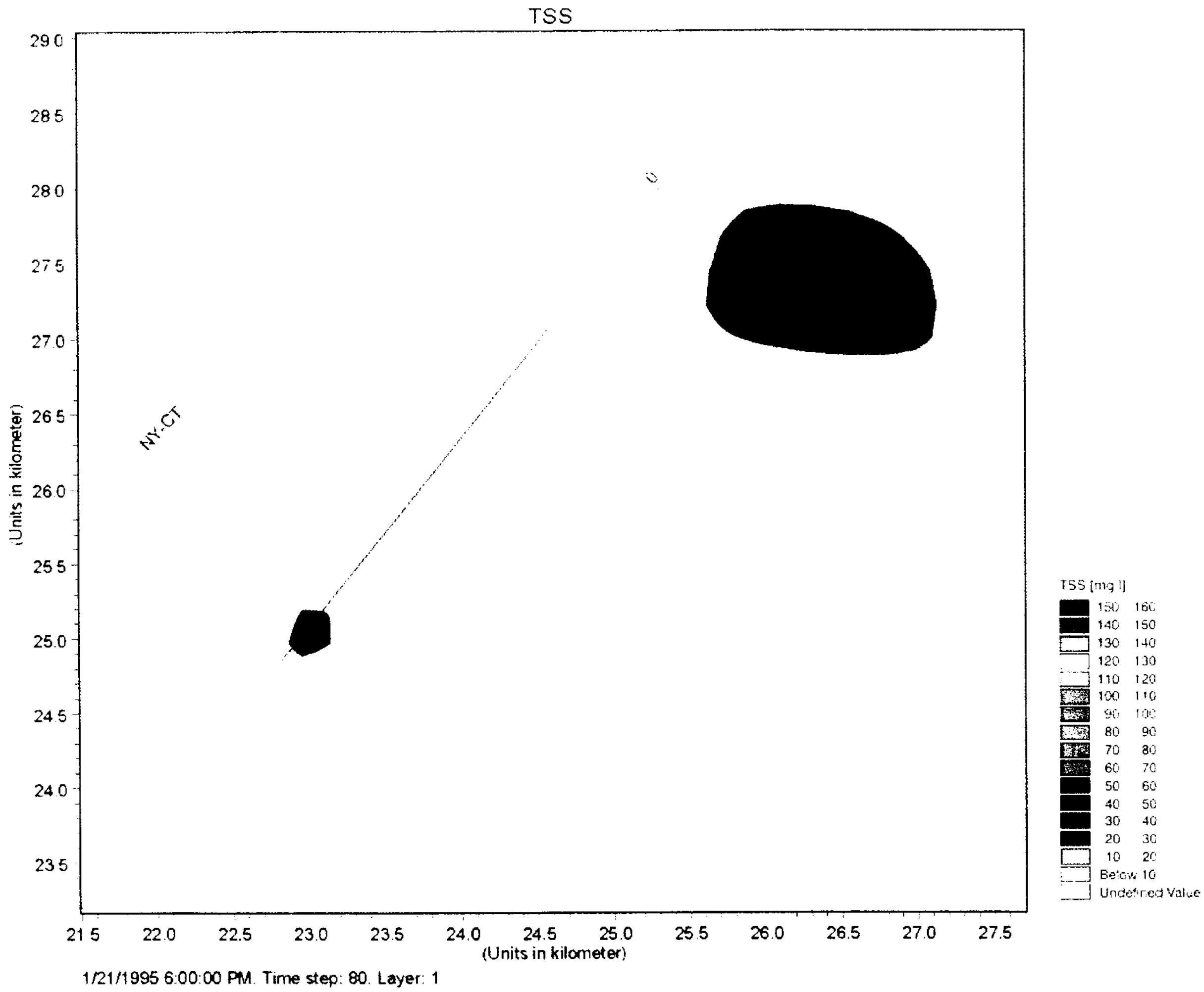

Figure 56A Bottom at Timestep = 80 (expanded scale)

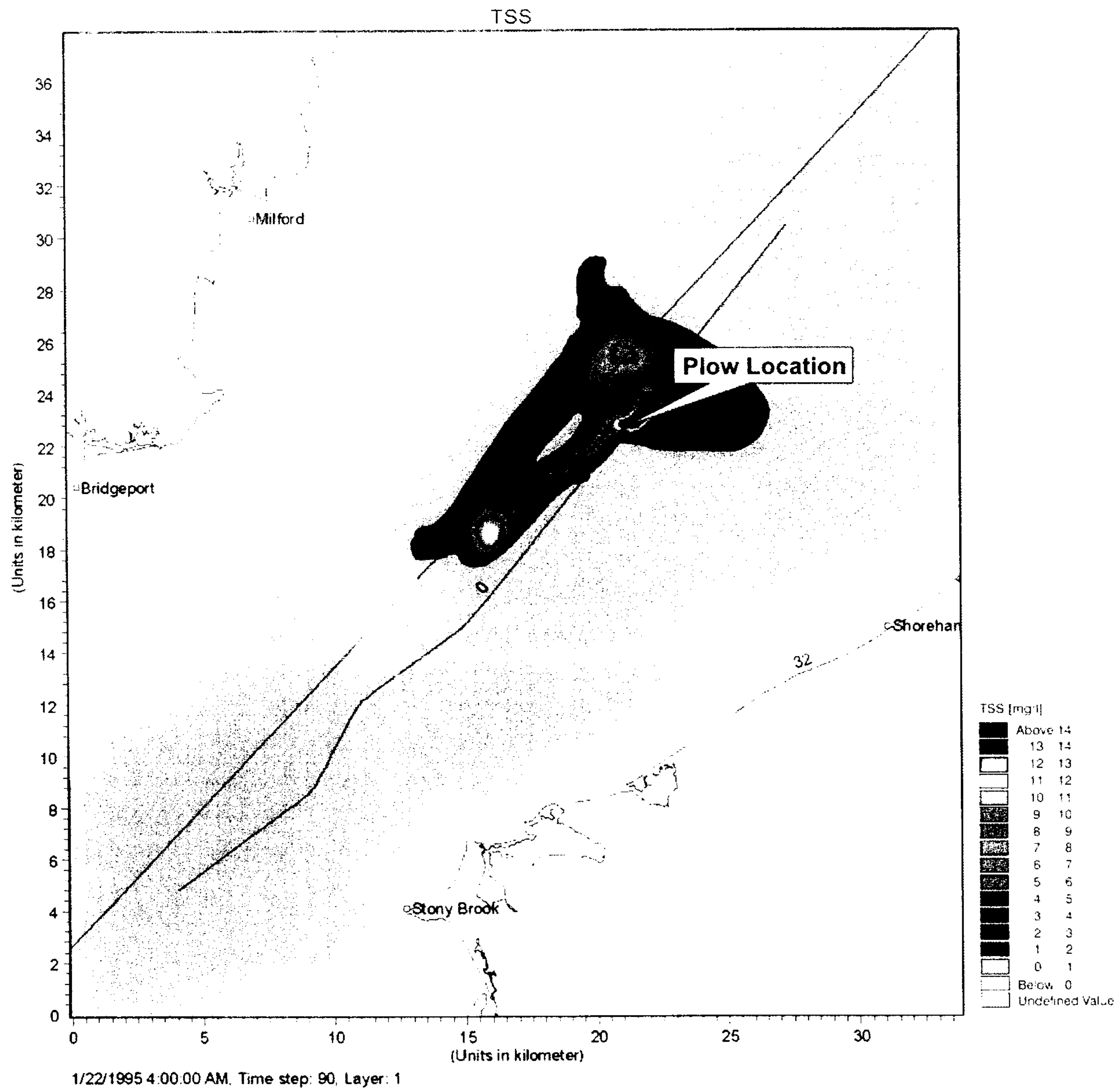

Figure 57 **Bottom at Timestep = 90**

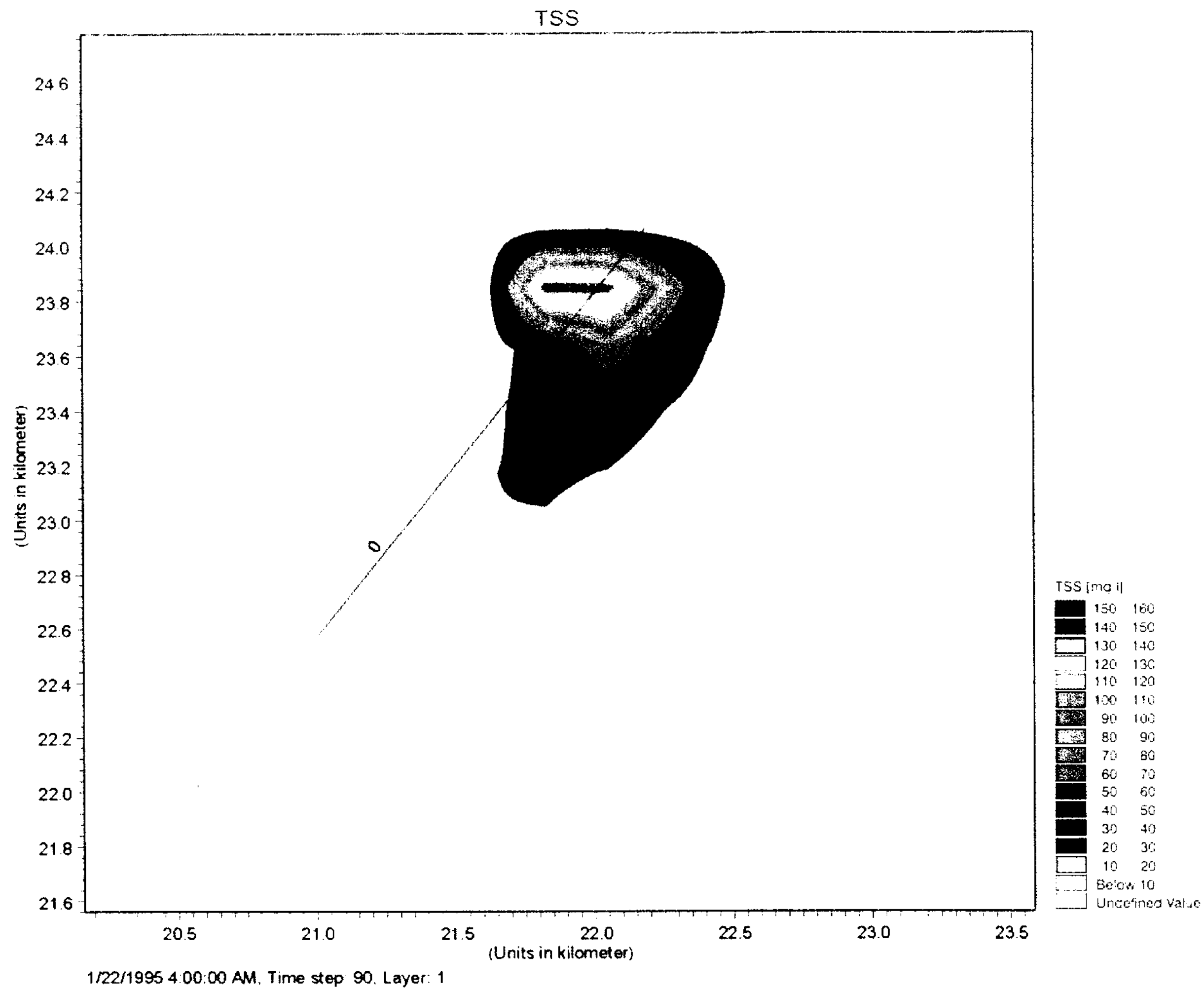

Figure 57A Bottom at Timestep = 90 (expanded scale)

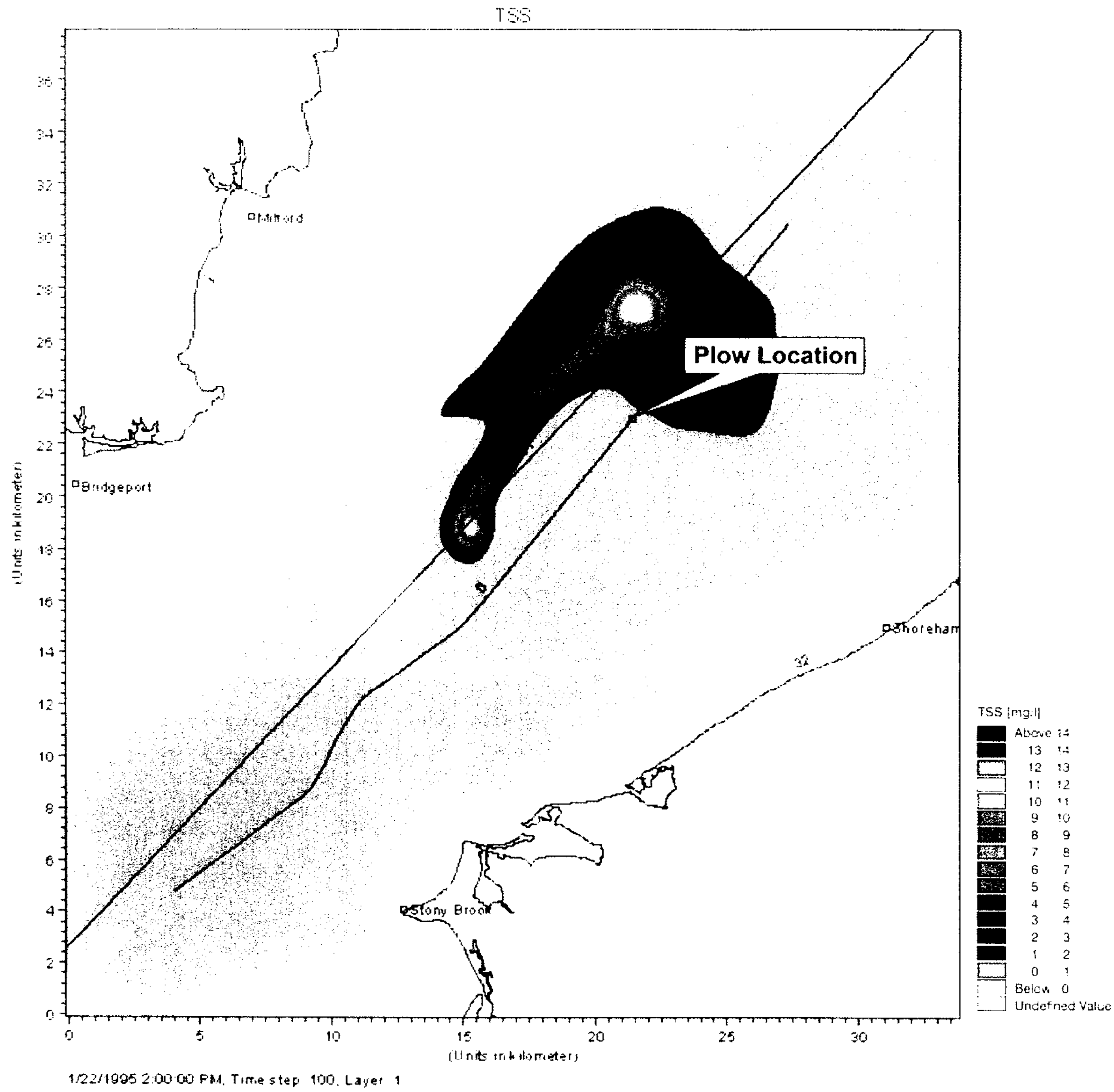

Figure 58 Bottom at Timestep = 100

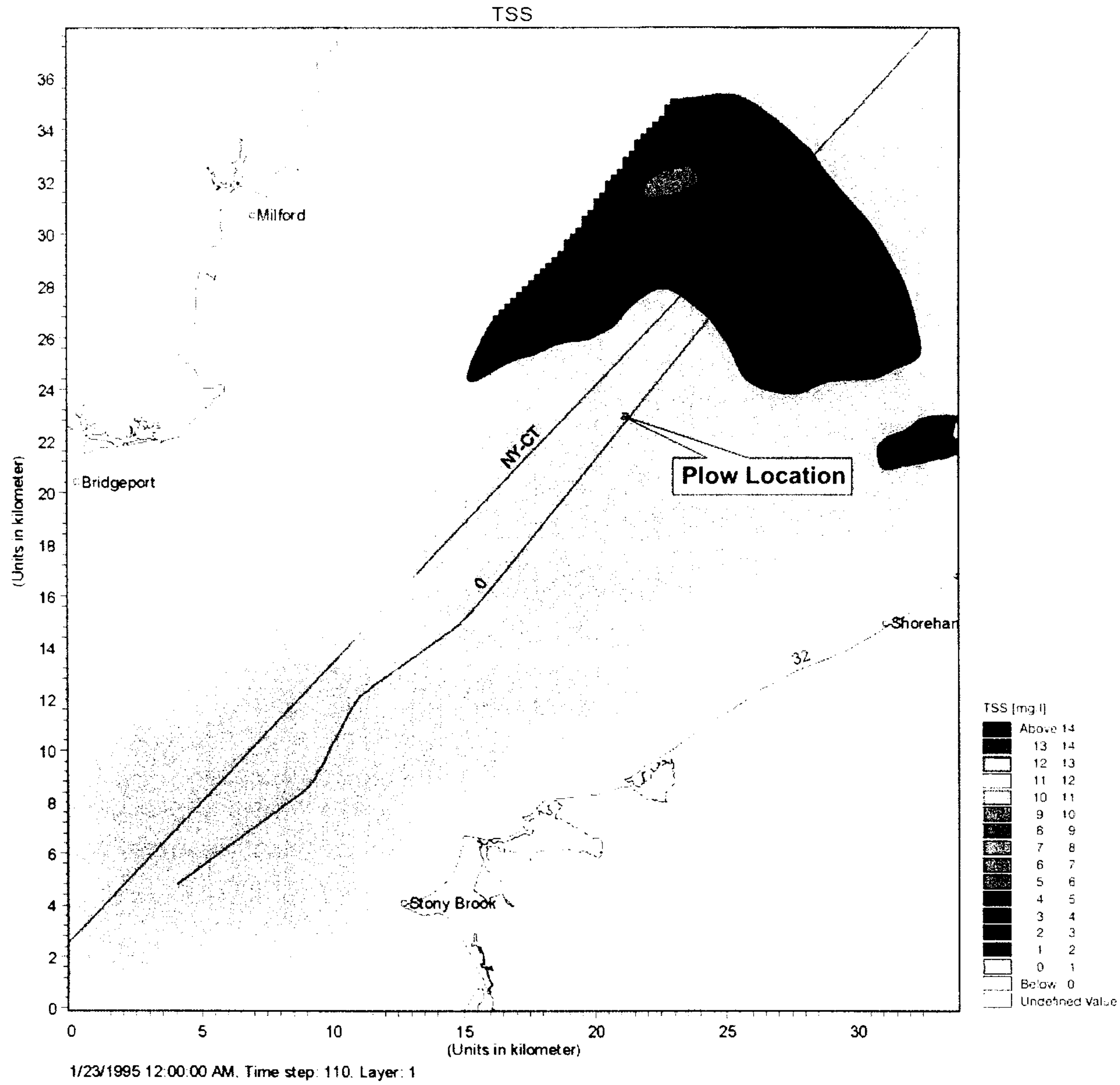

Figure 59 Bottom at Timestep = 110

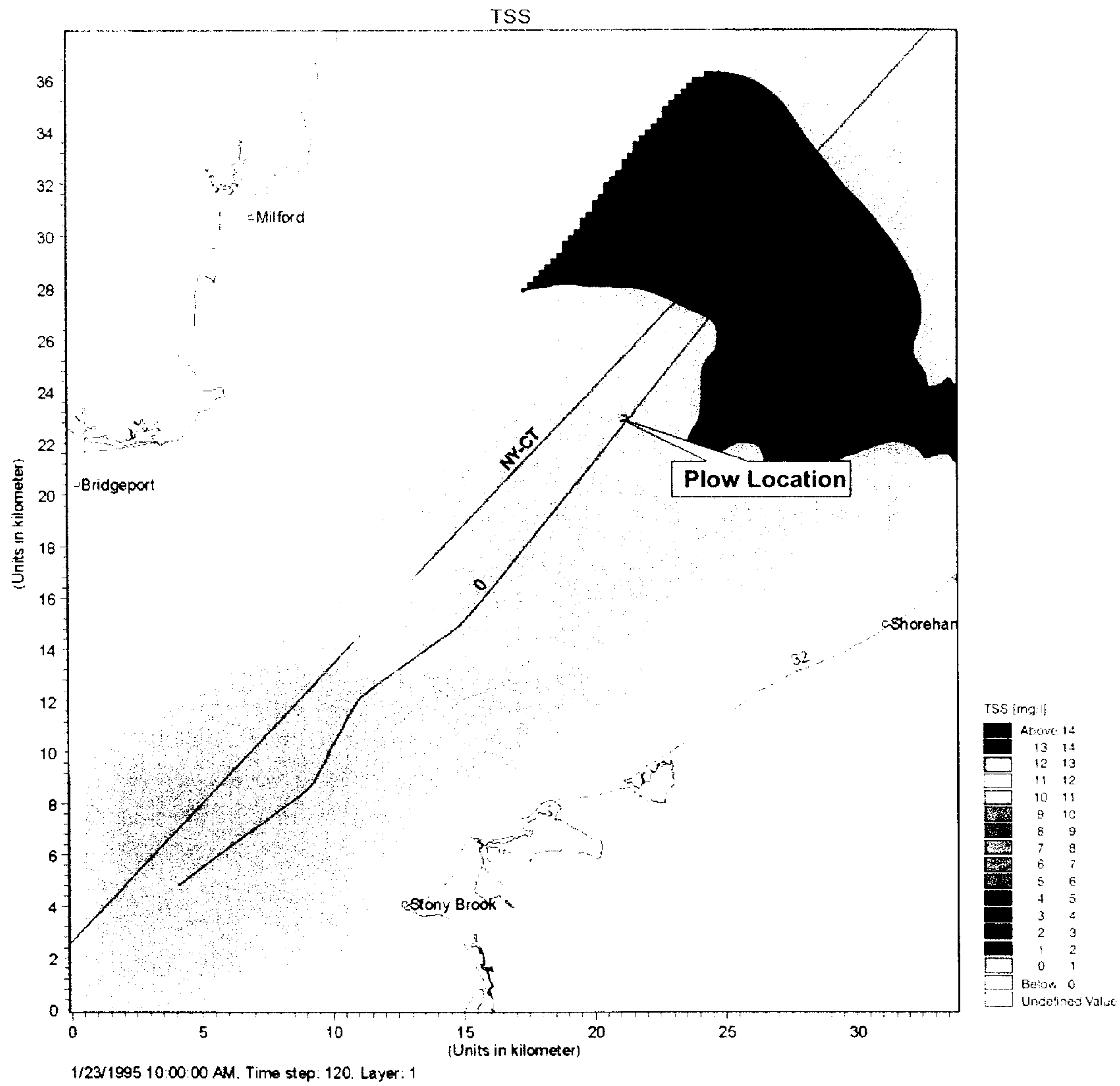

Figure 60 Bottom at Timestep = 120

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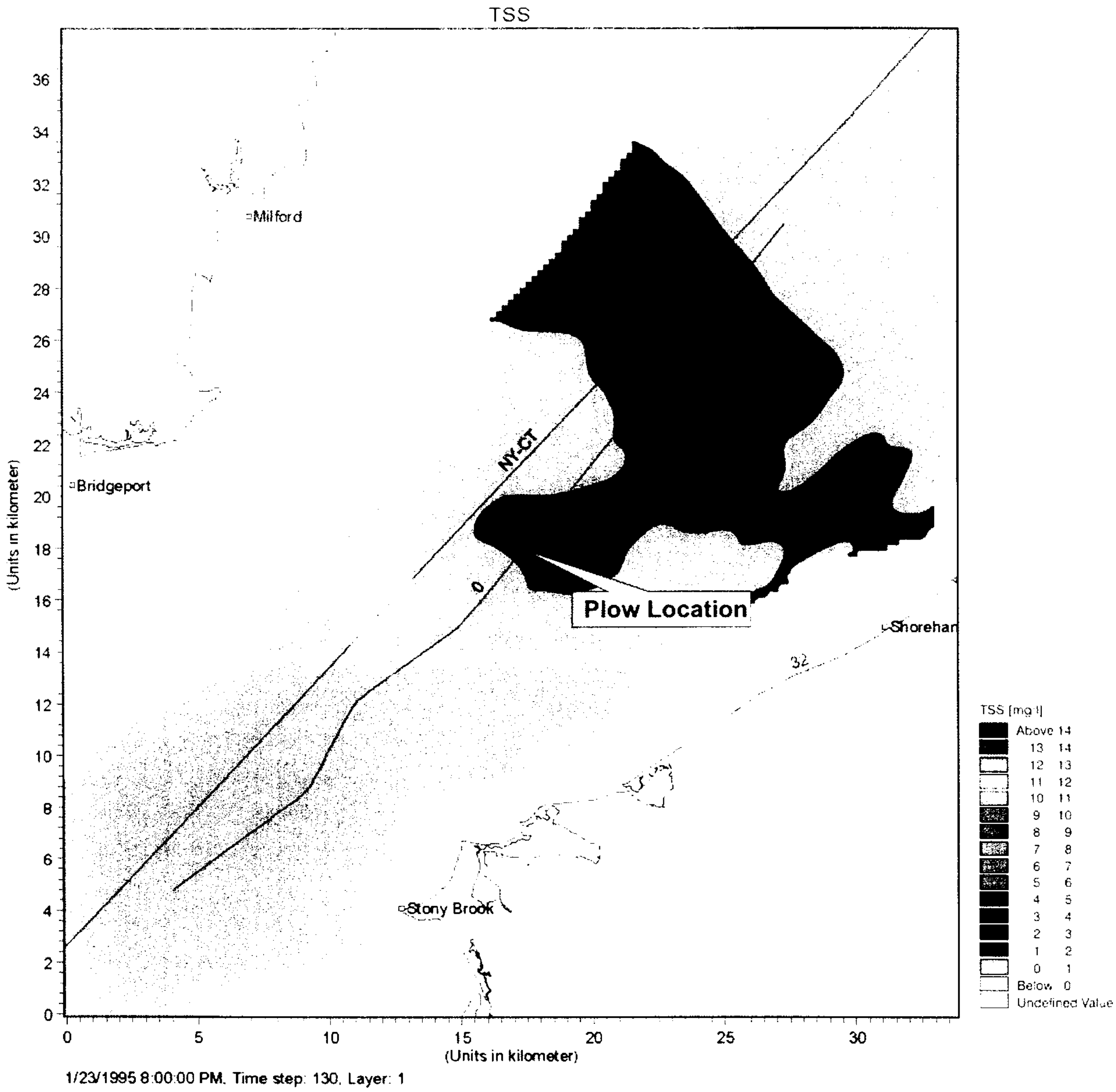

Figure 61 Bottom at Timestep = 130

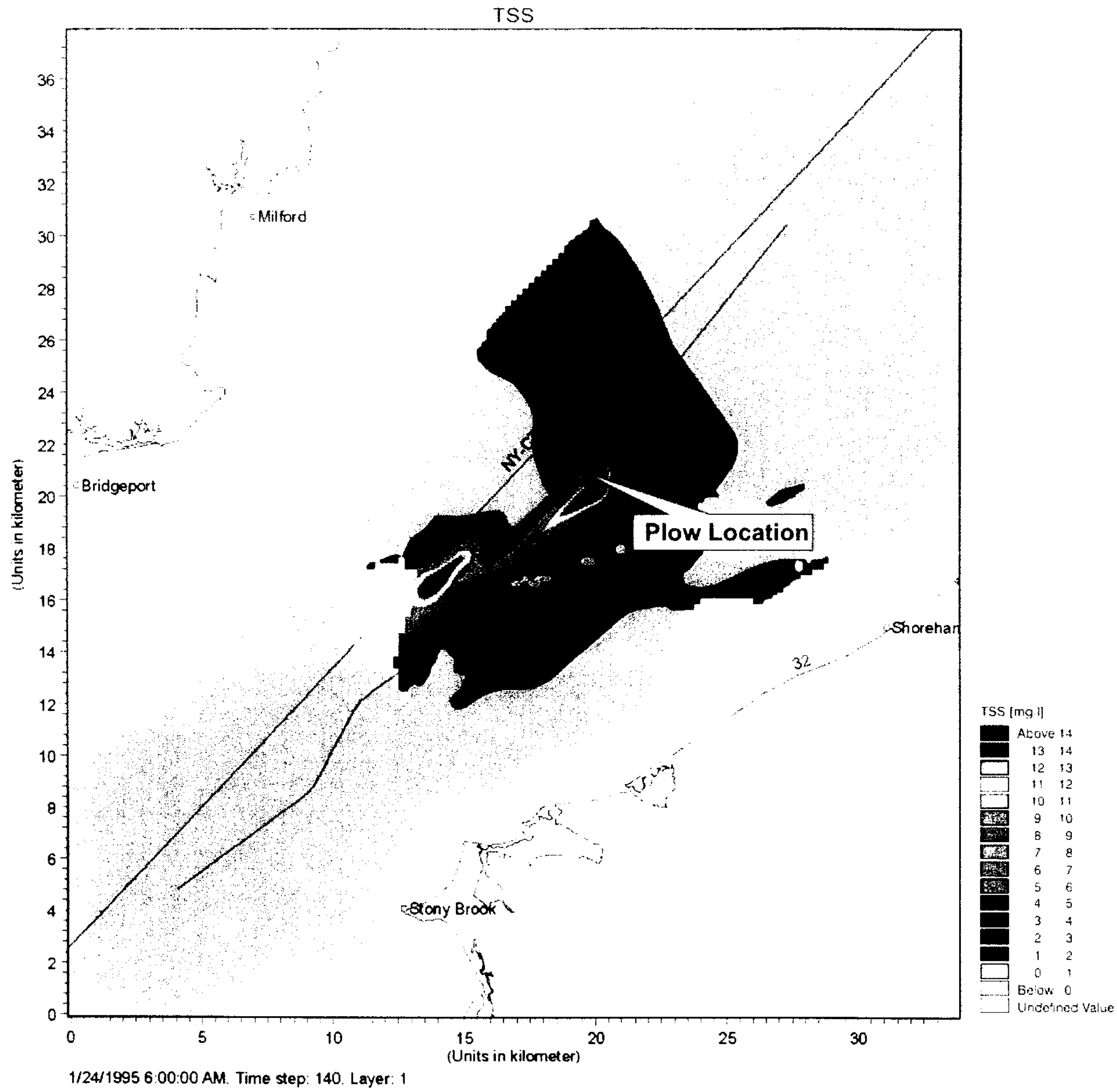

Figure 62 Bottom at Timestep = 140

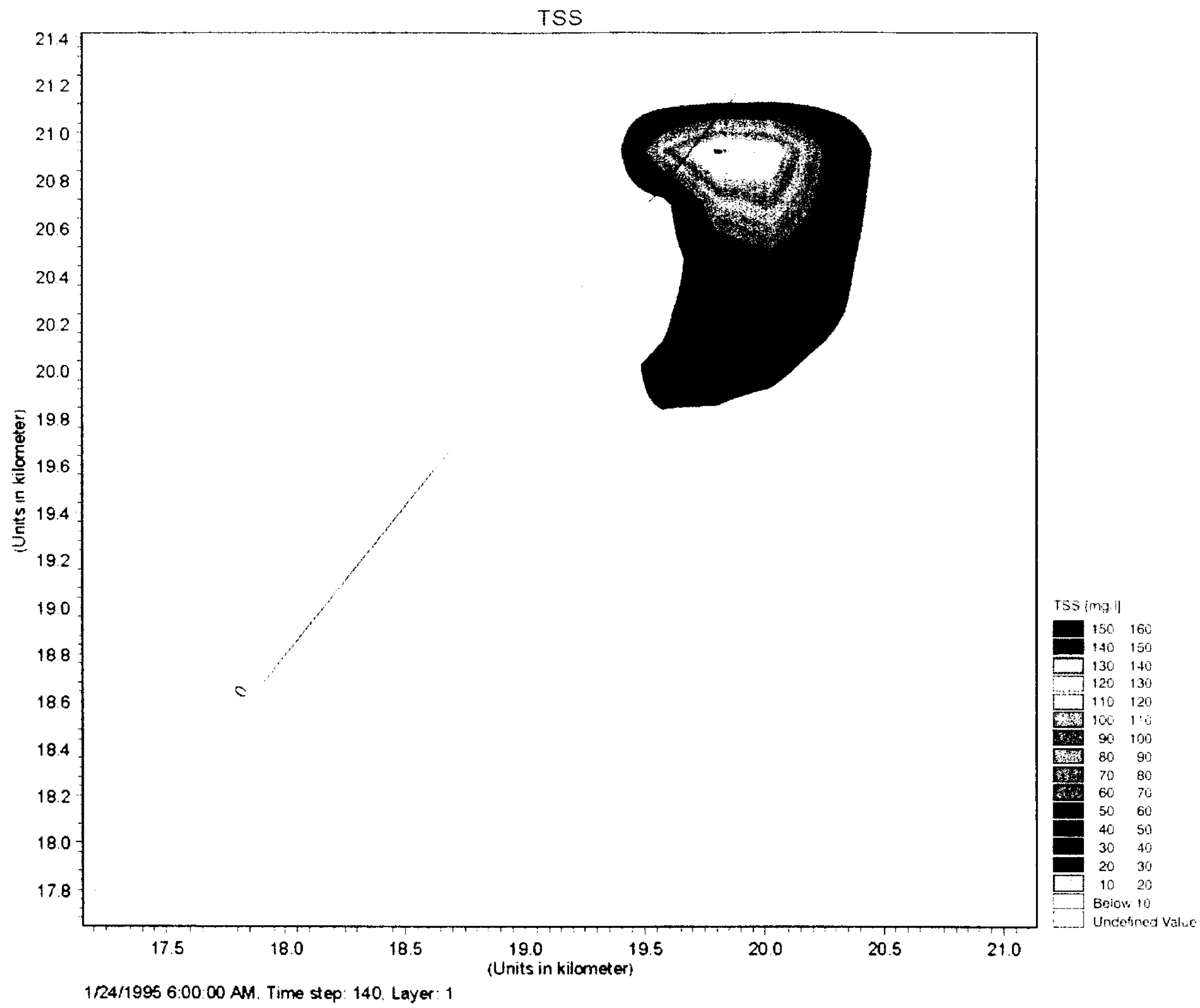

Figure 62A Bottom at Timestep = 140 (expanded scale)

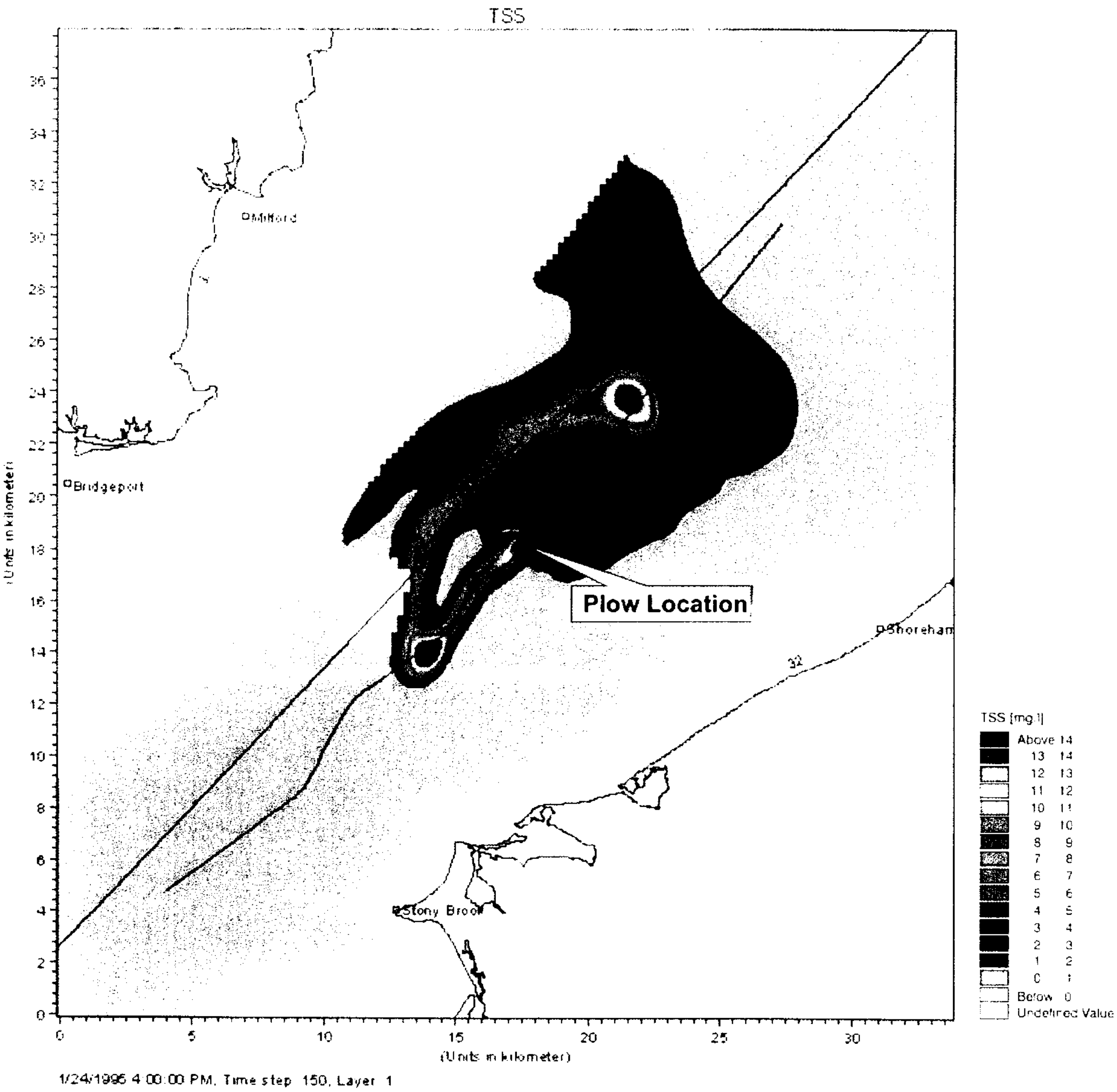

Figure 63 Bottom at Timestep = 150

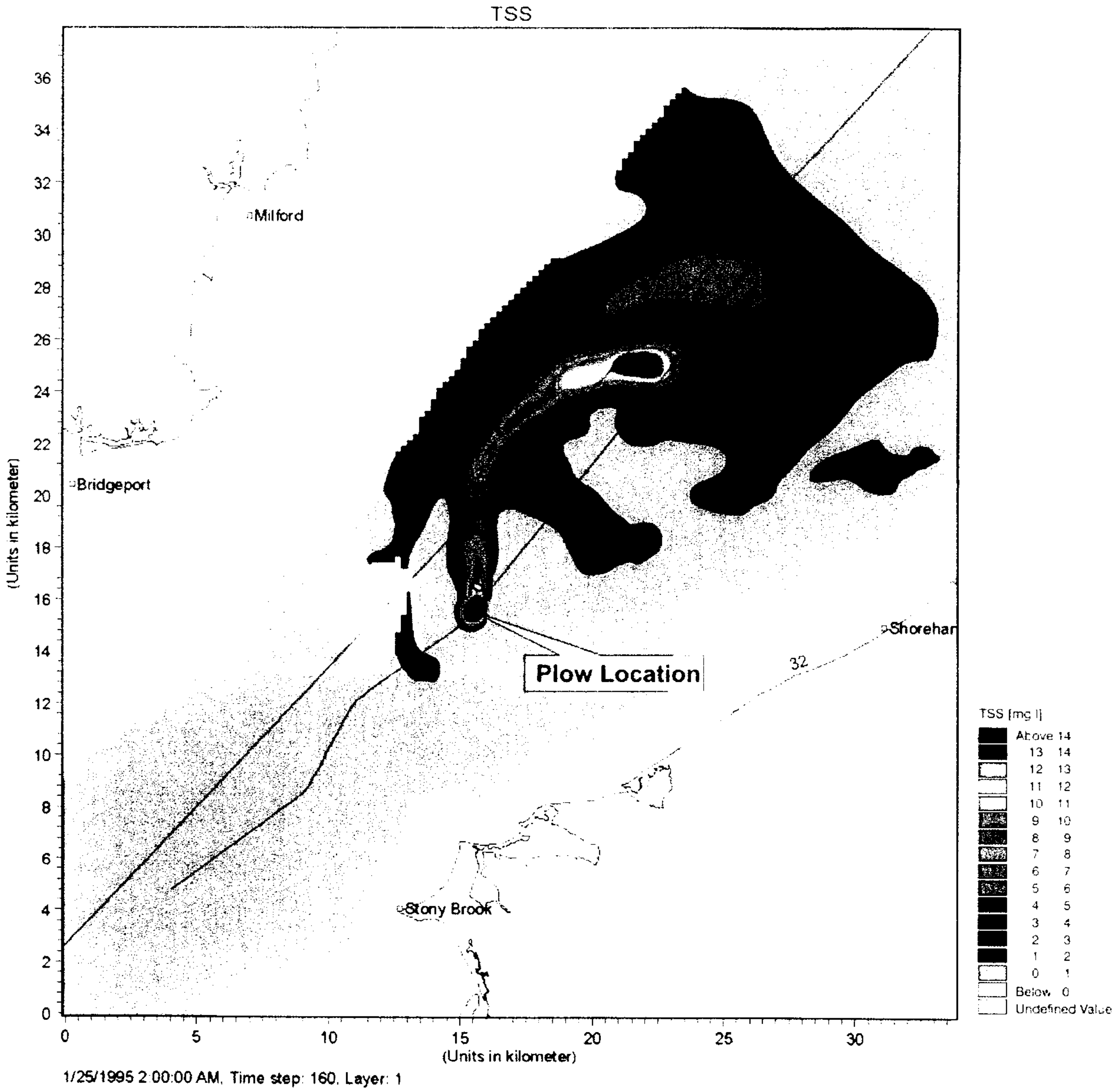

Figure 64 Bottom at Timestep = 160

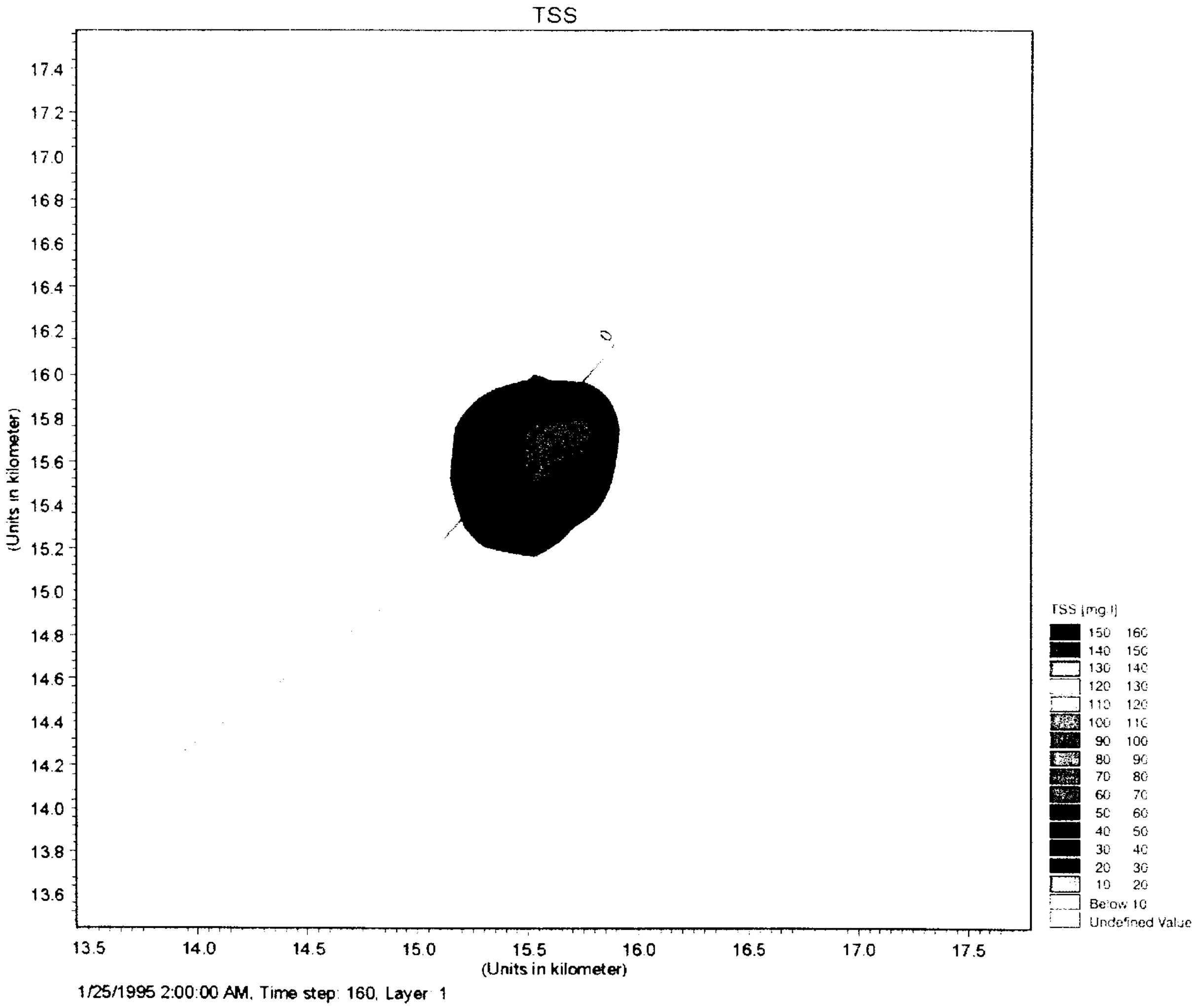

Figure 64A Bottom at Timestep = 160 (expanded scale)

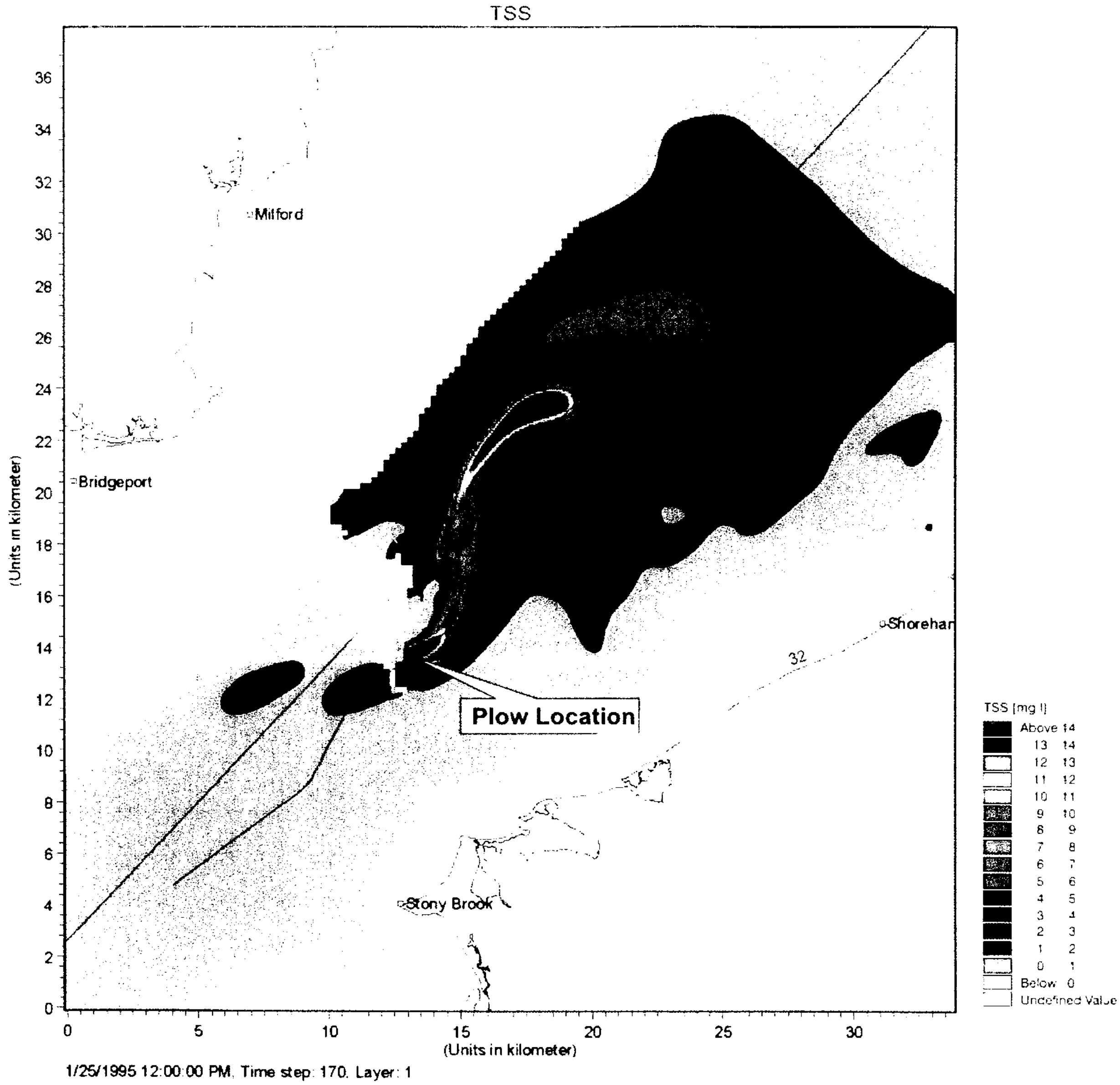

Figure 65 Bottom at Timestep = 170

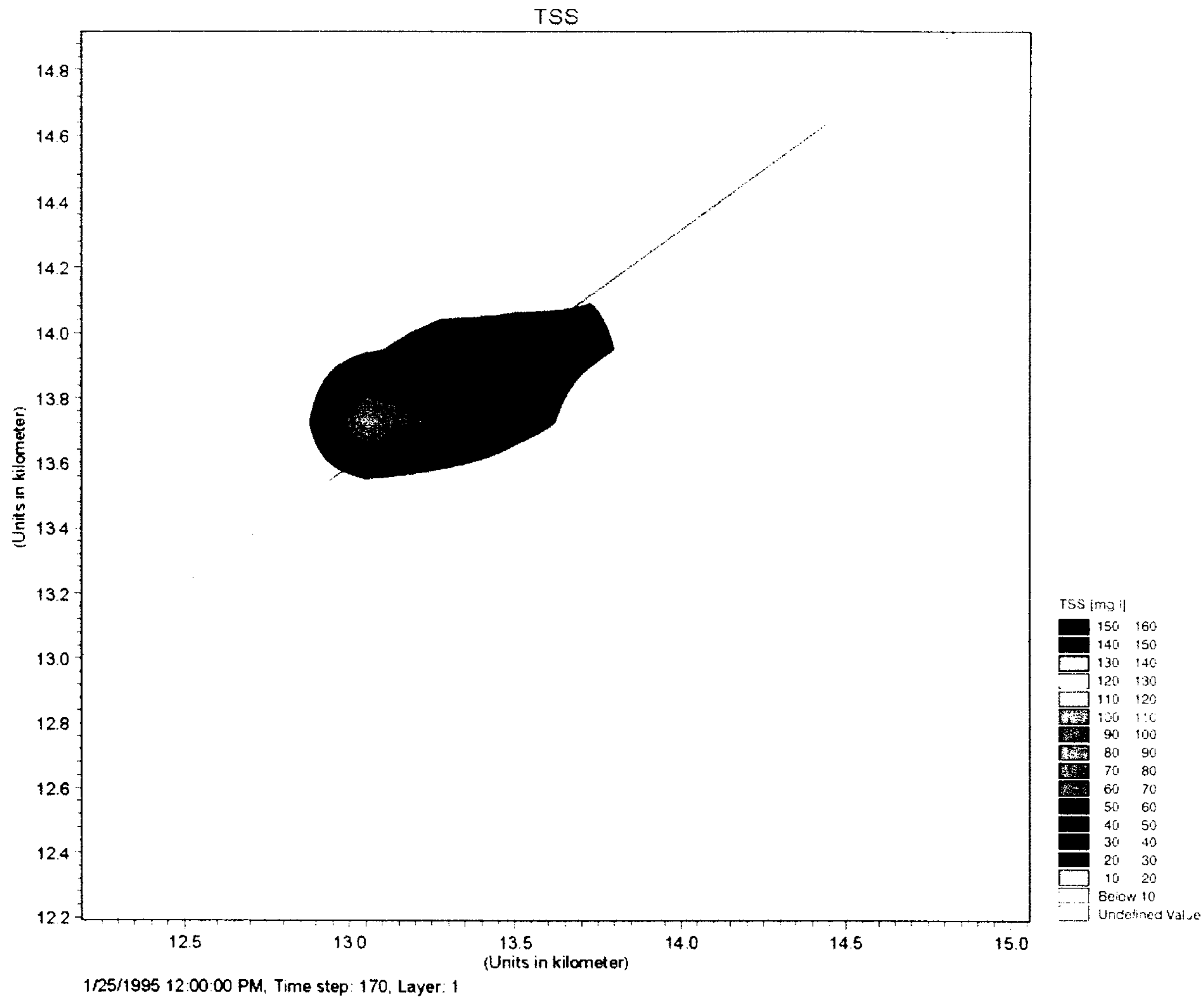

Figure 65A Bottom at Timestep = 170 (expanded scale)

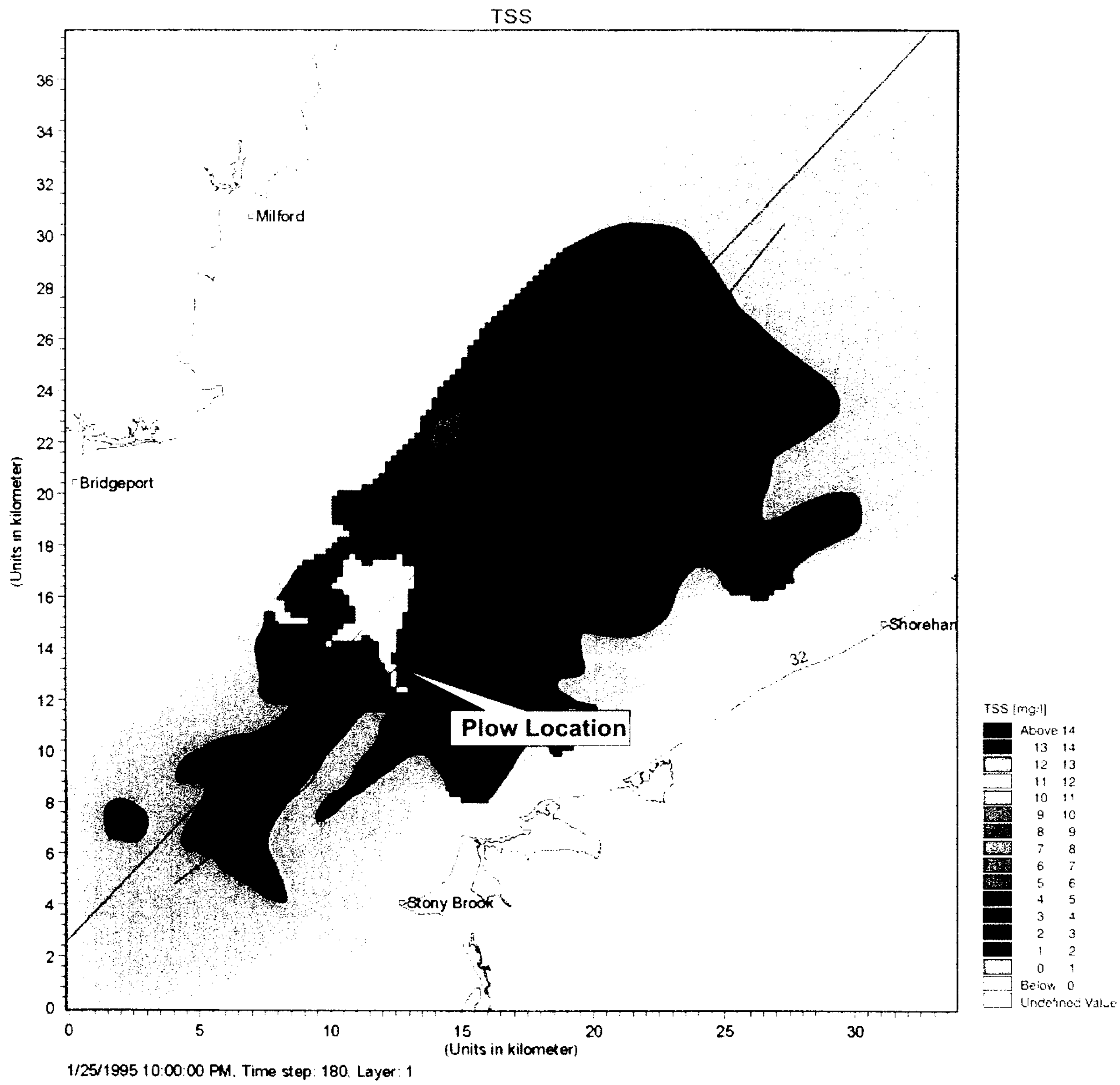

Figure 66 Bottom at Timestep = 180

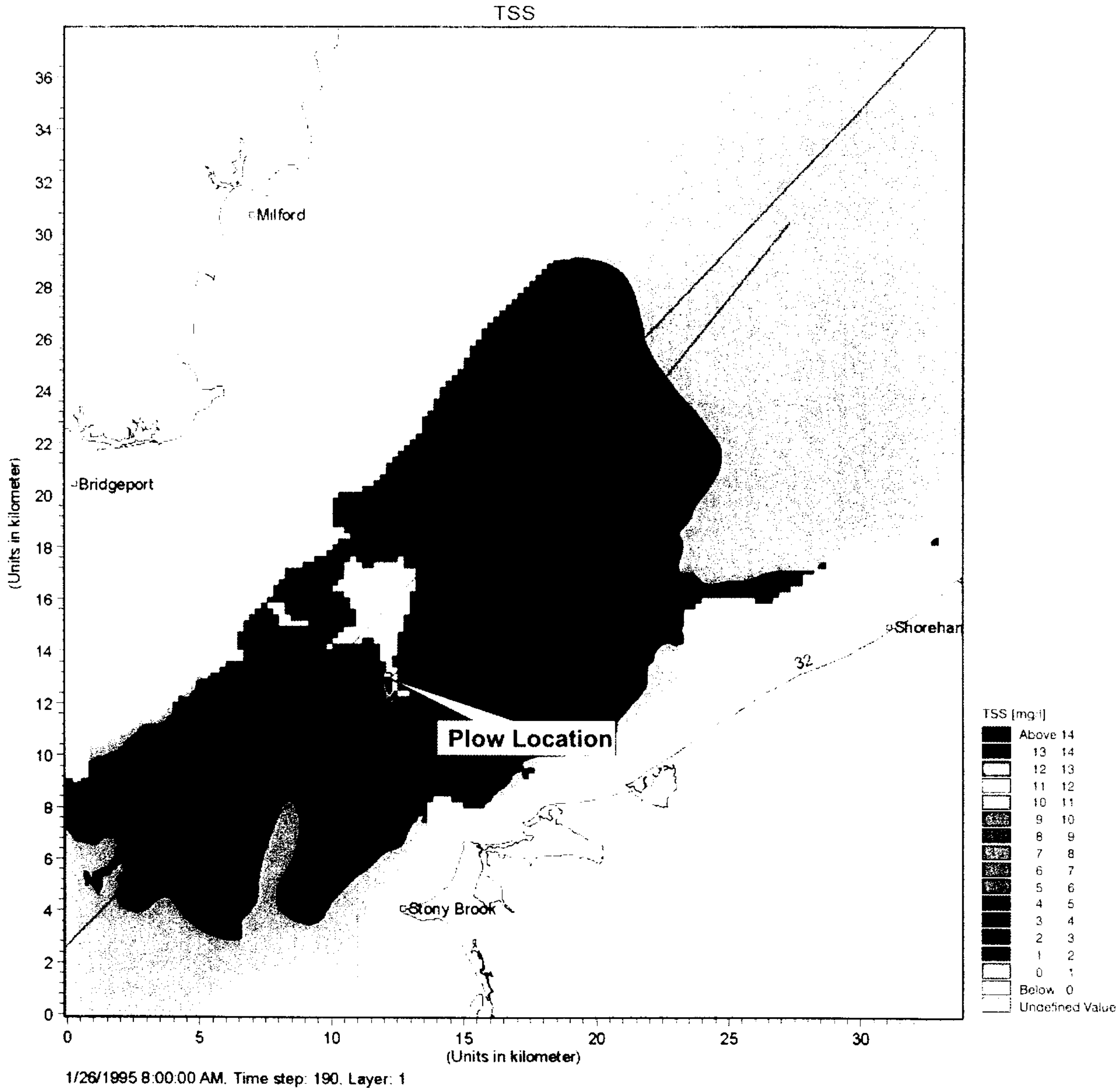

Figure 67 Bottom at Timestep = 190

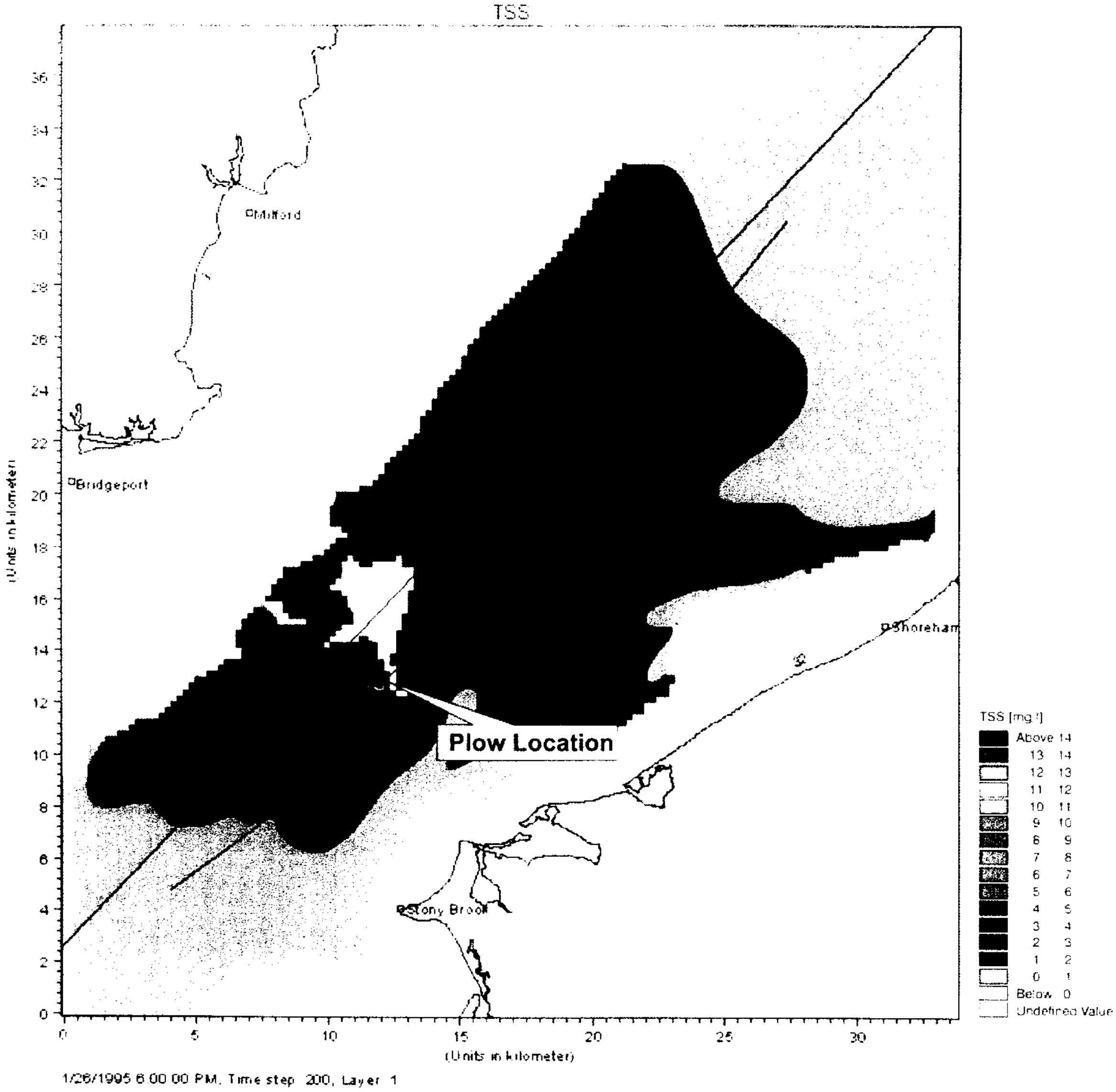

Figure 68 Bottom at Timestep = 200

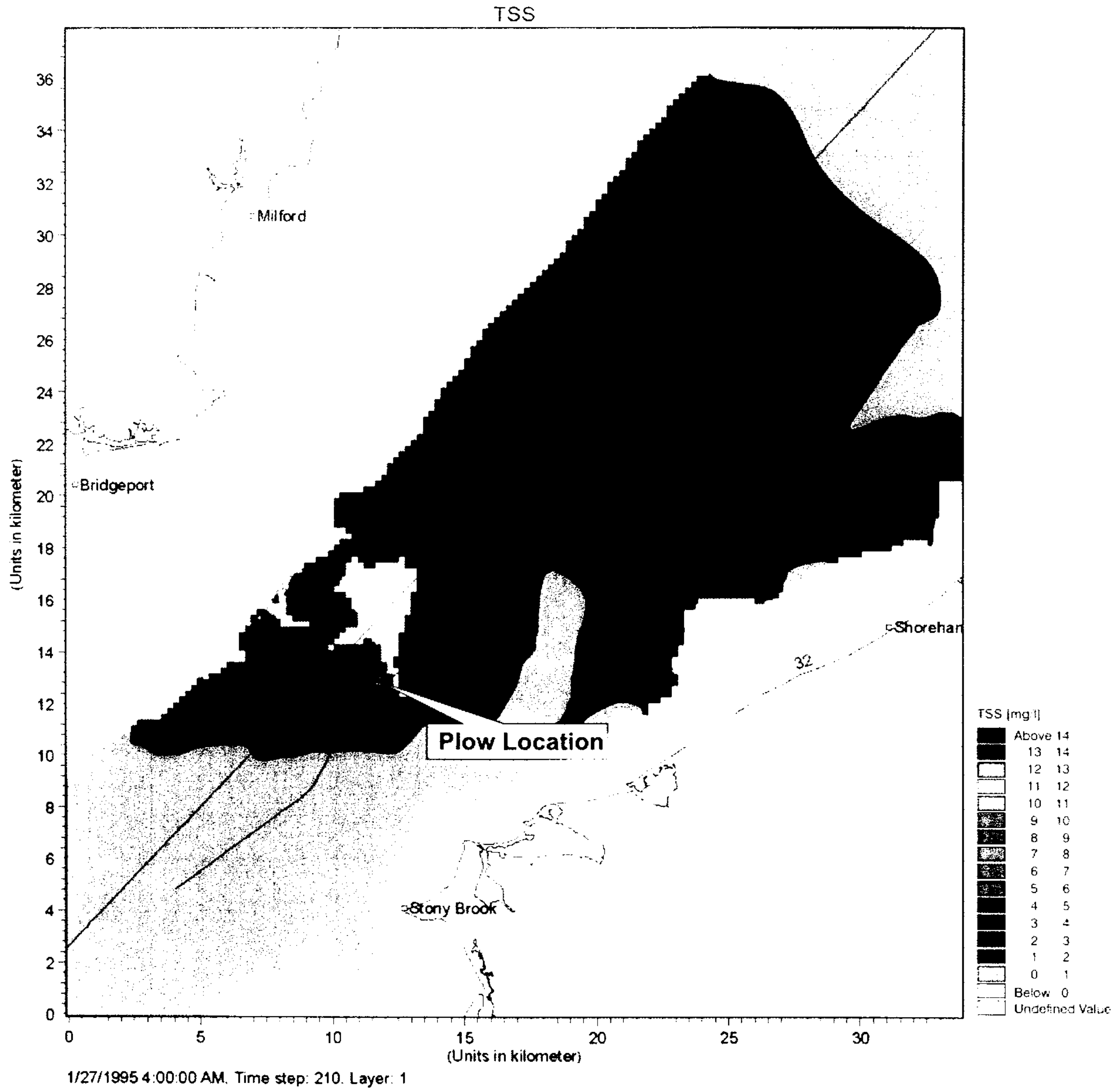

Figure 69 Bottom at Timestep = 210

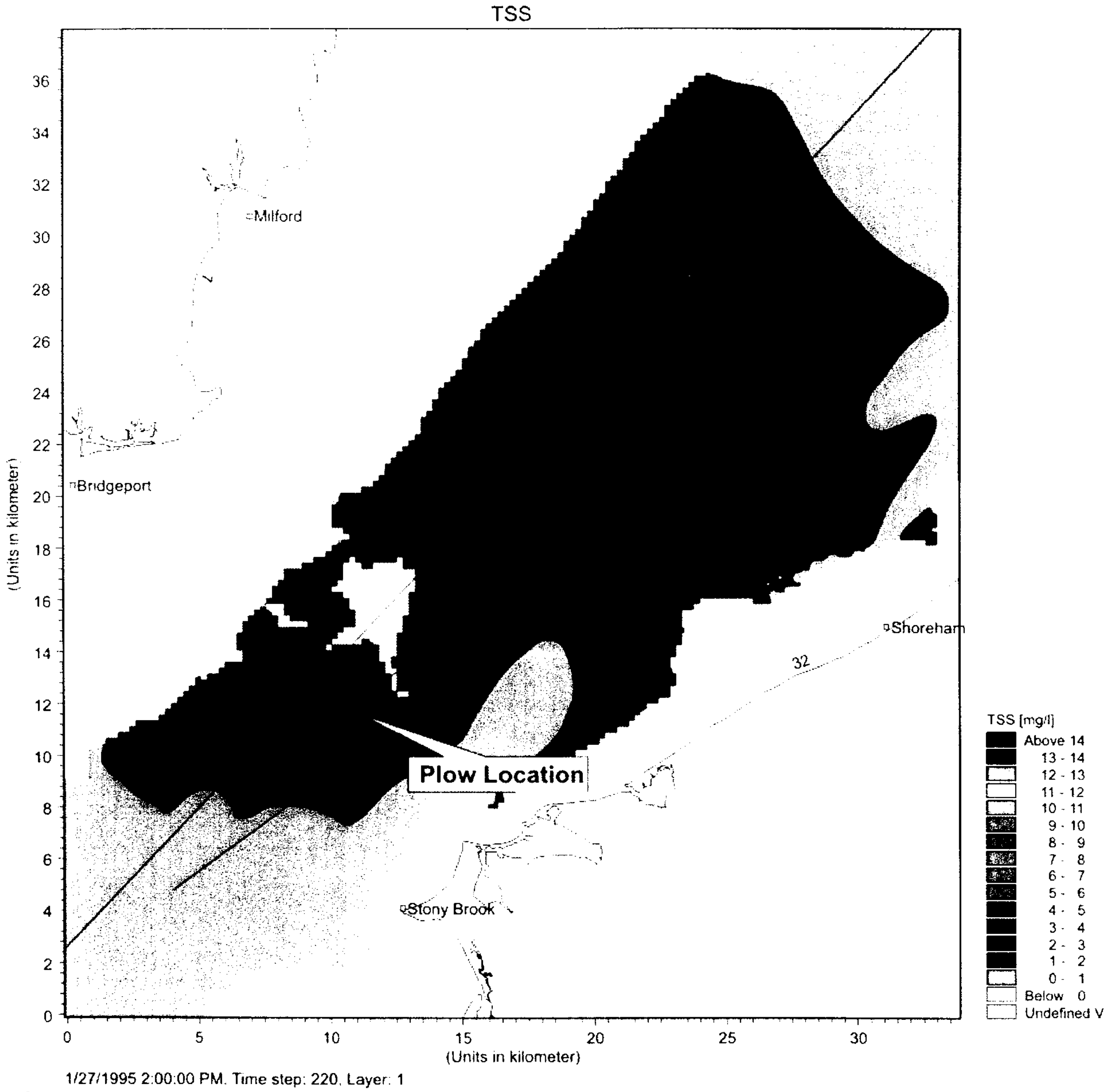

Figure 70 Bottom at Timestep = 220

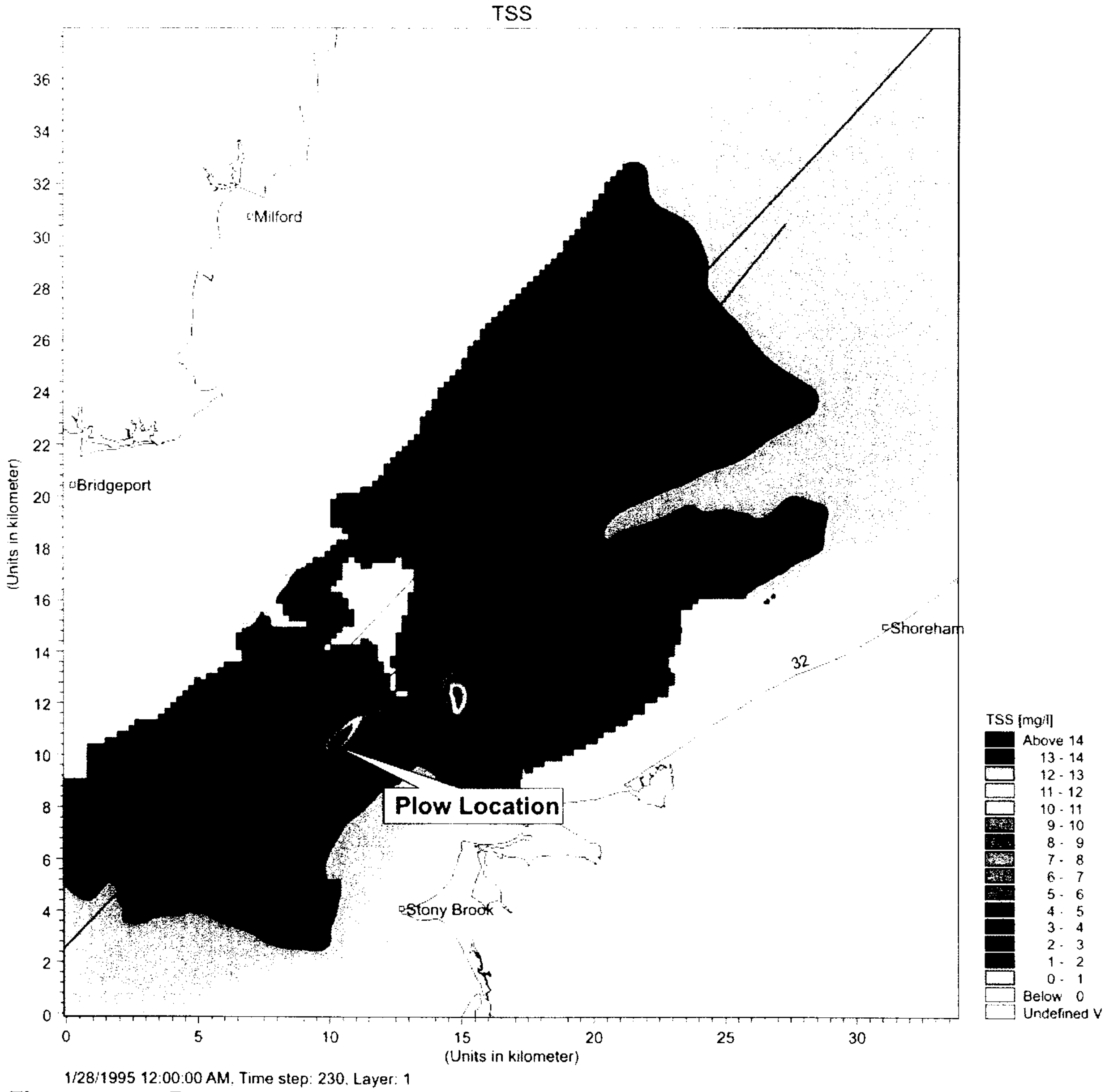

Figure 71 Bottom at Timestep = 230

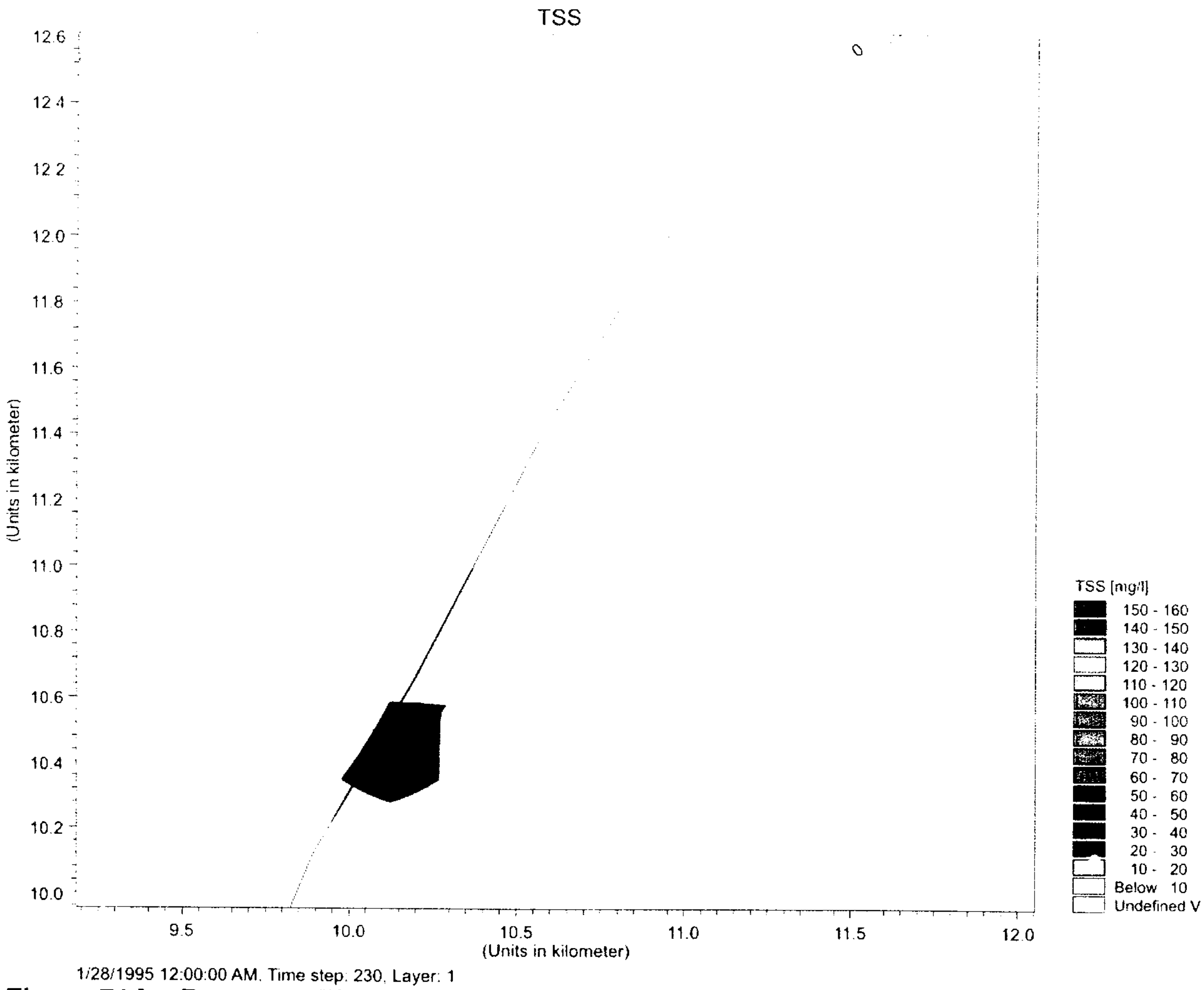

Figure 71A Bottom at Timestep = 230 (expanded scale)

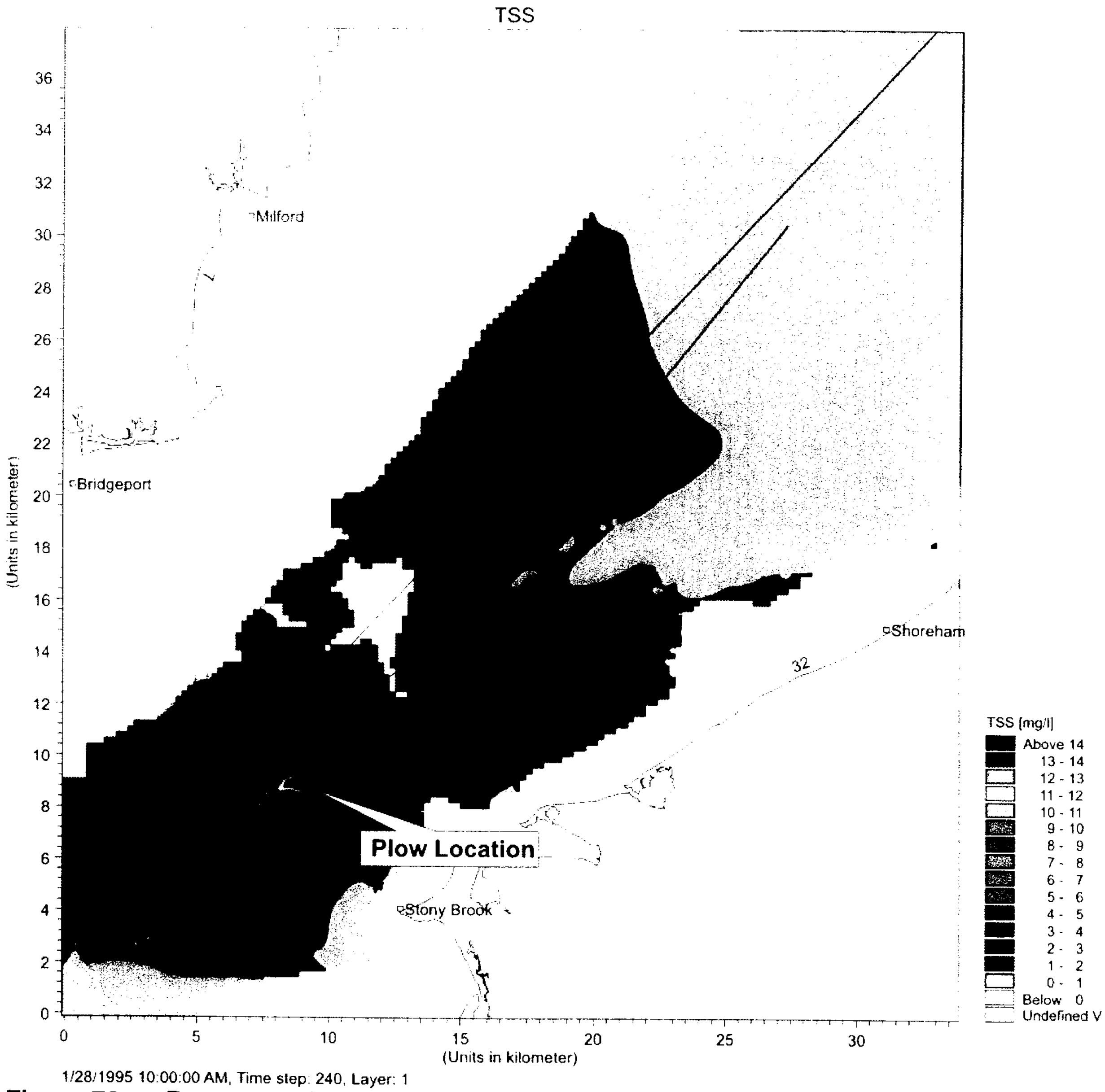

Figure 72 Bottom at Timestep = 240

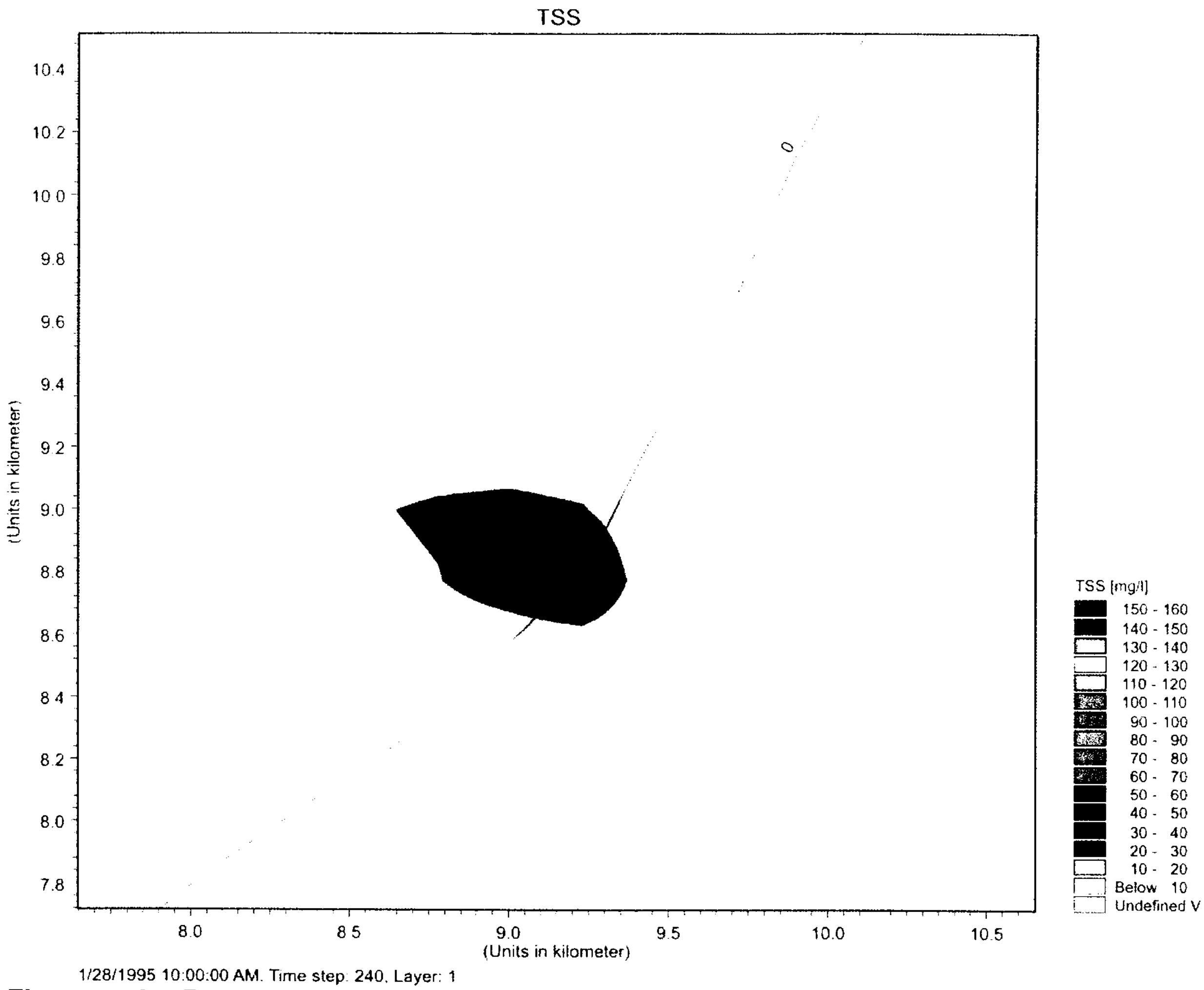

Figure 72A Bottom at Timestep = 240 (expanded scale)

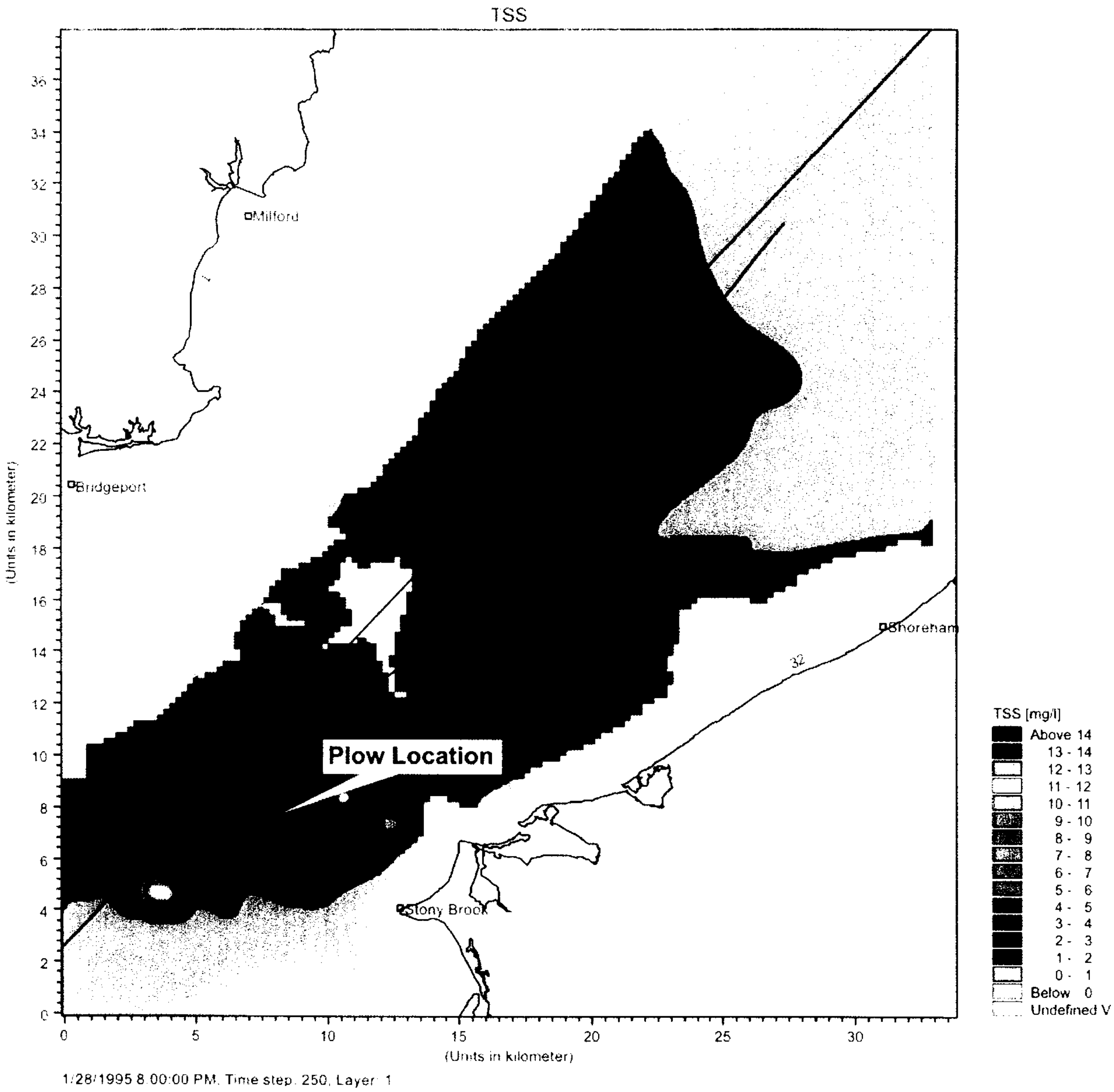

Figure 73 Bottom at Timestep = 250

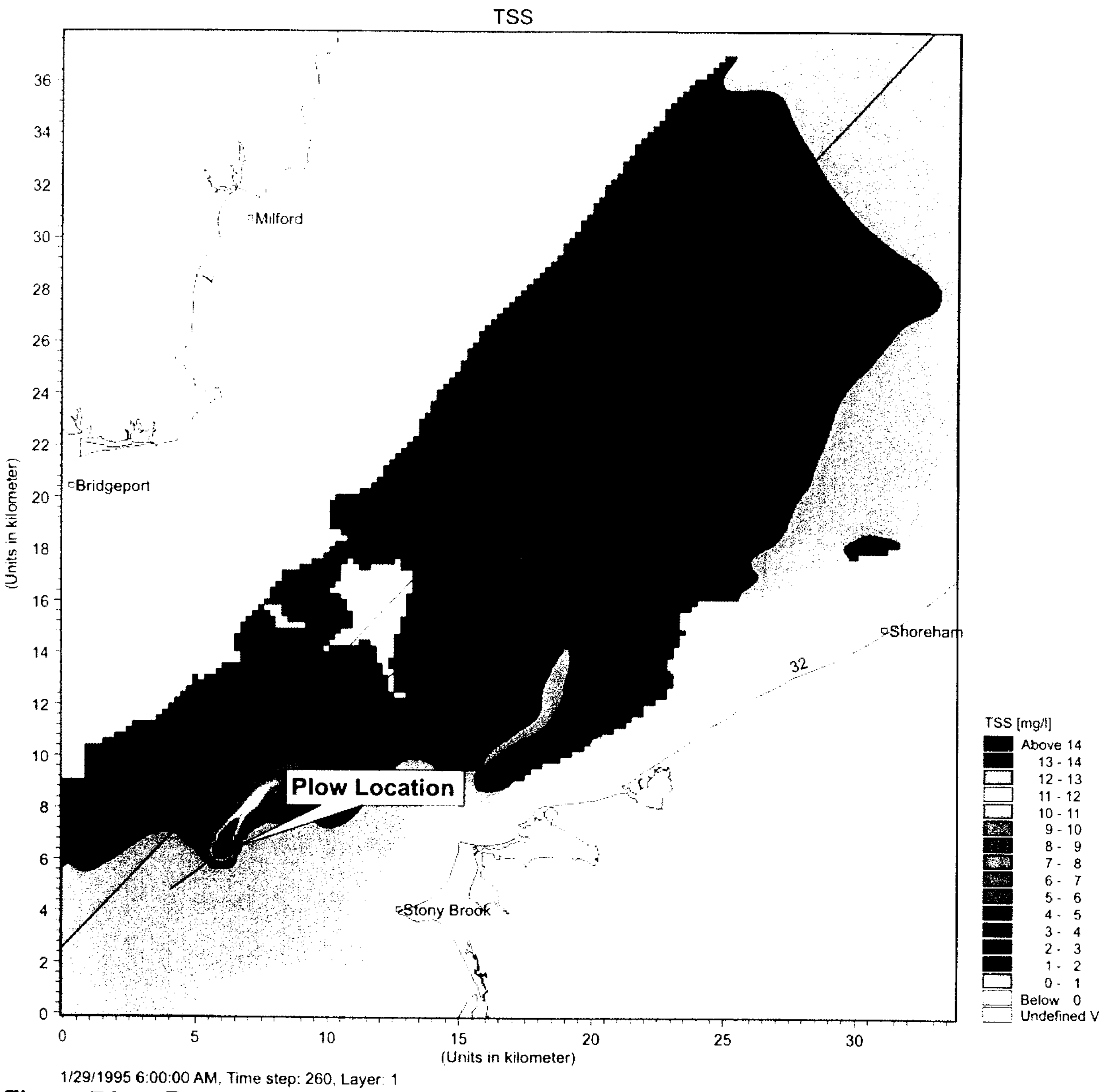

Figure 74 Bottom at Timestep = 260

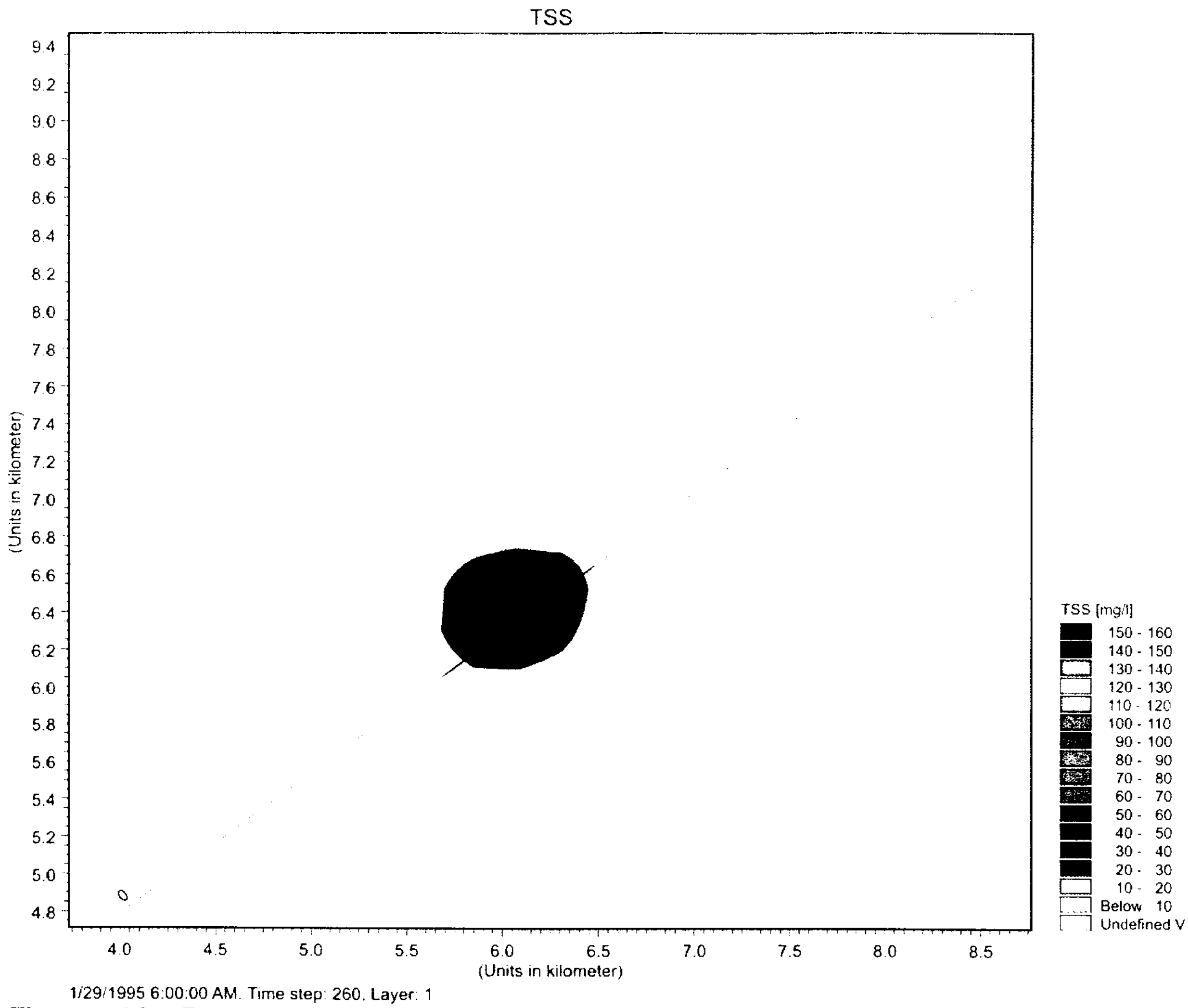

Figure 74A Bottom at Timestep = 260 (expanded scale)

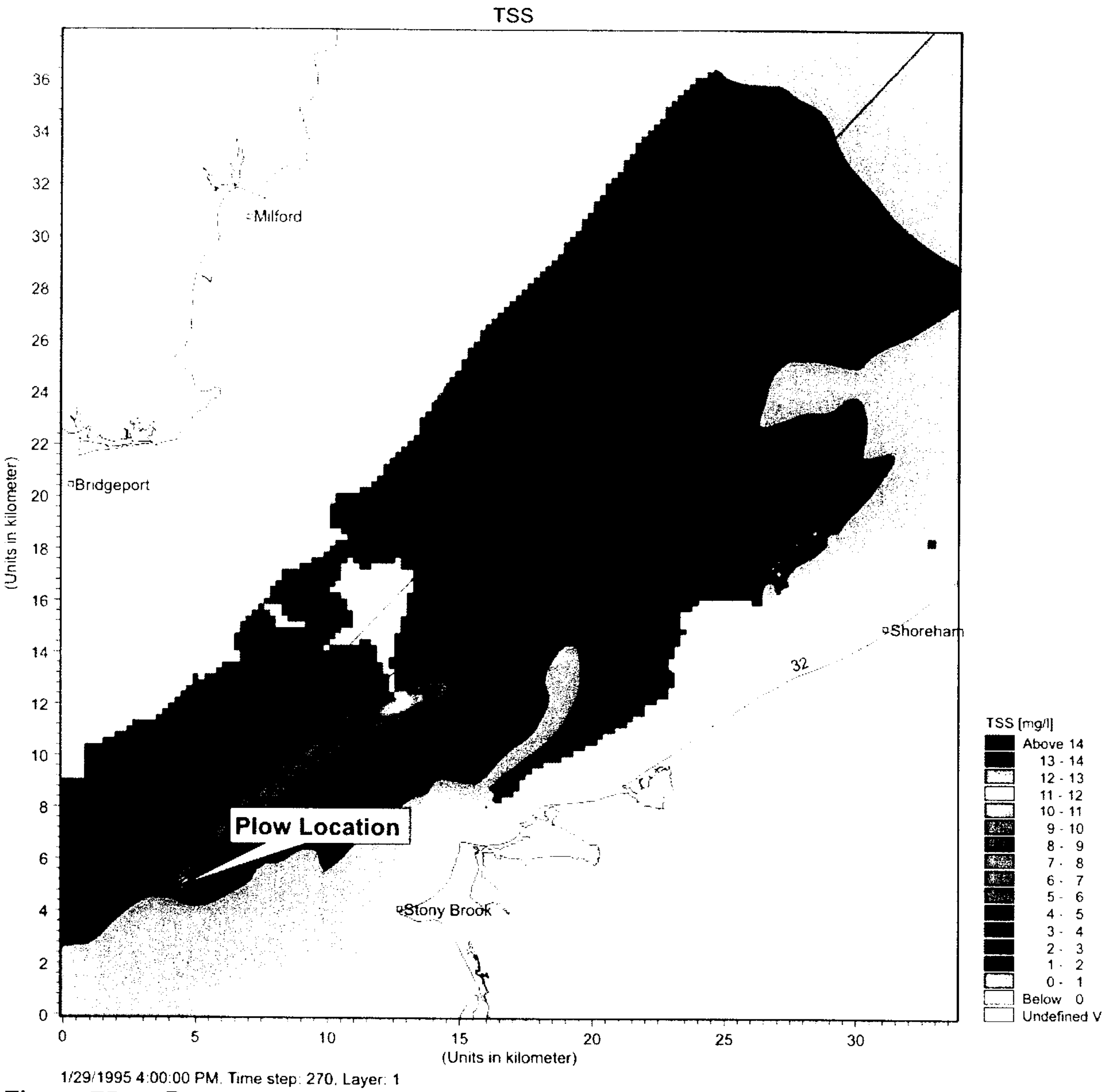

Figure 75 Bottom at Timestep = 270

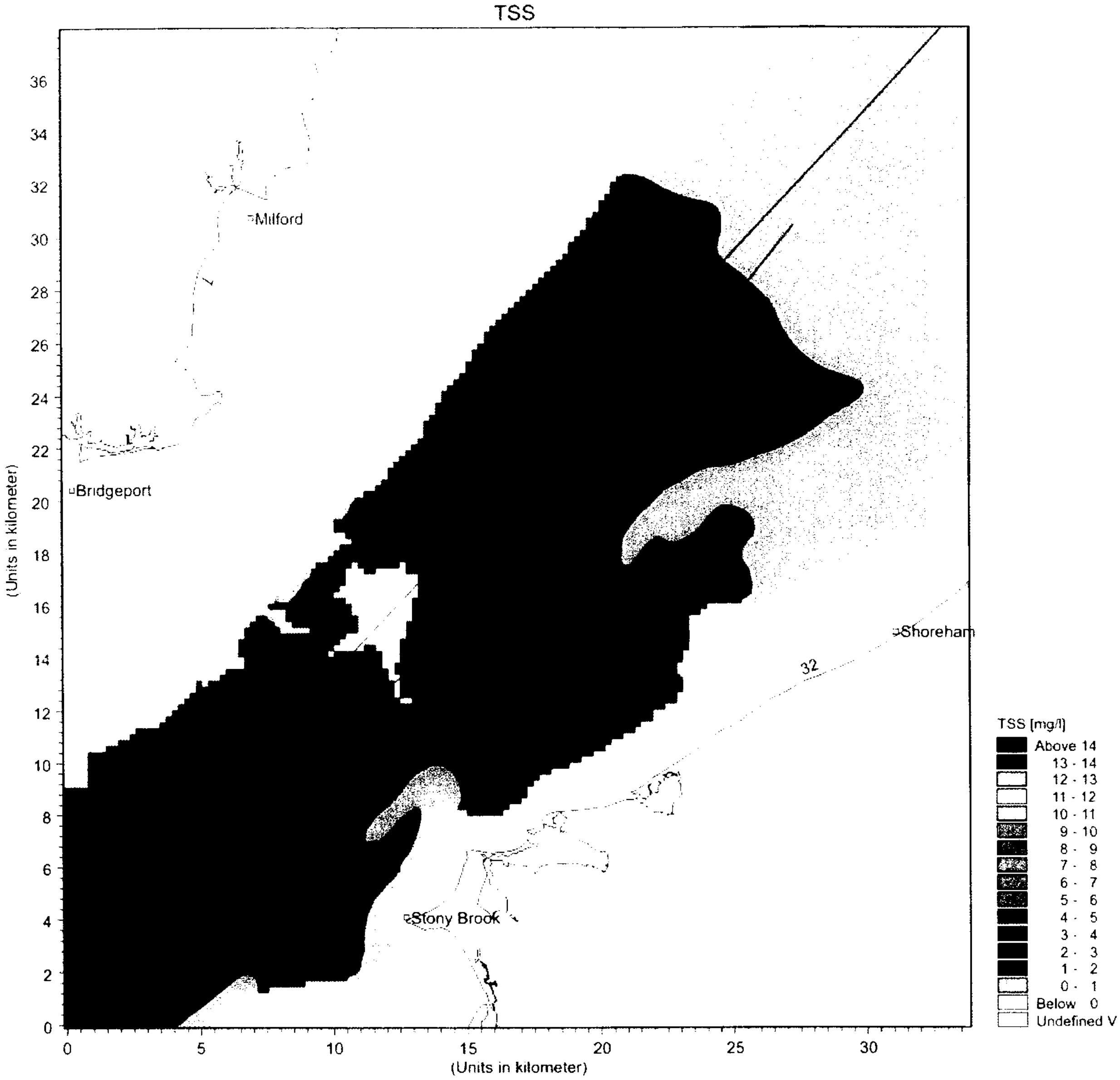

Figure 76 Bottom at Timestep = 280 (8 hours after end of plowing)

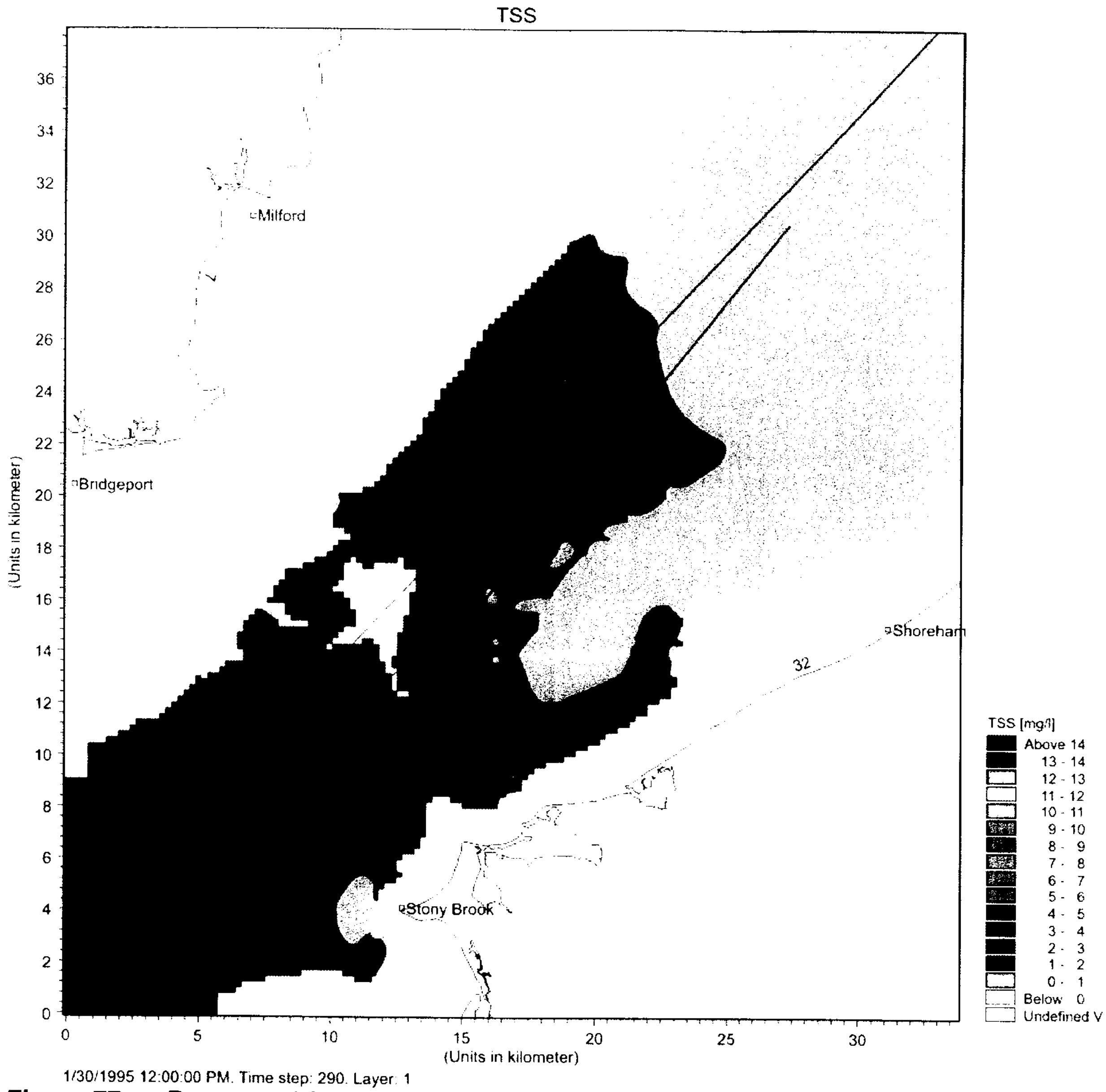

Figure 77 Bottom at Timestep = 290 (18 hours after end of plowing)

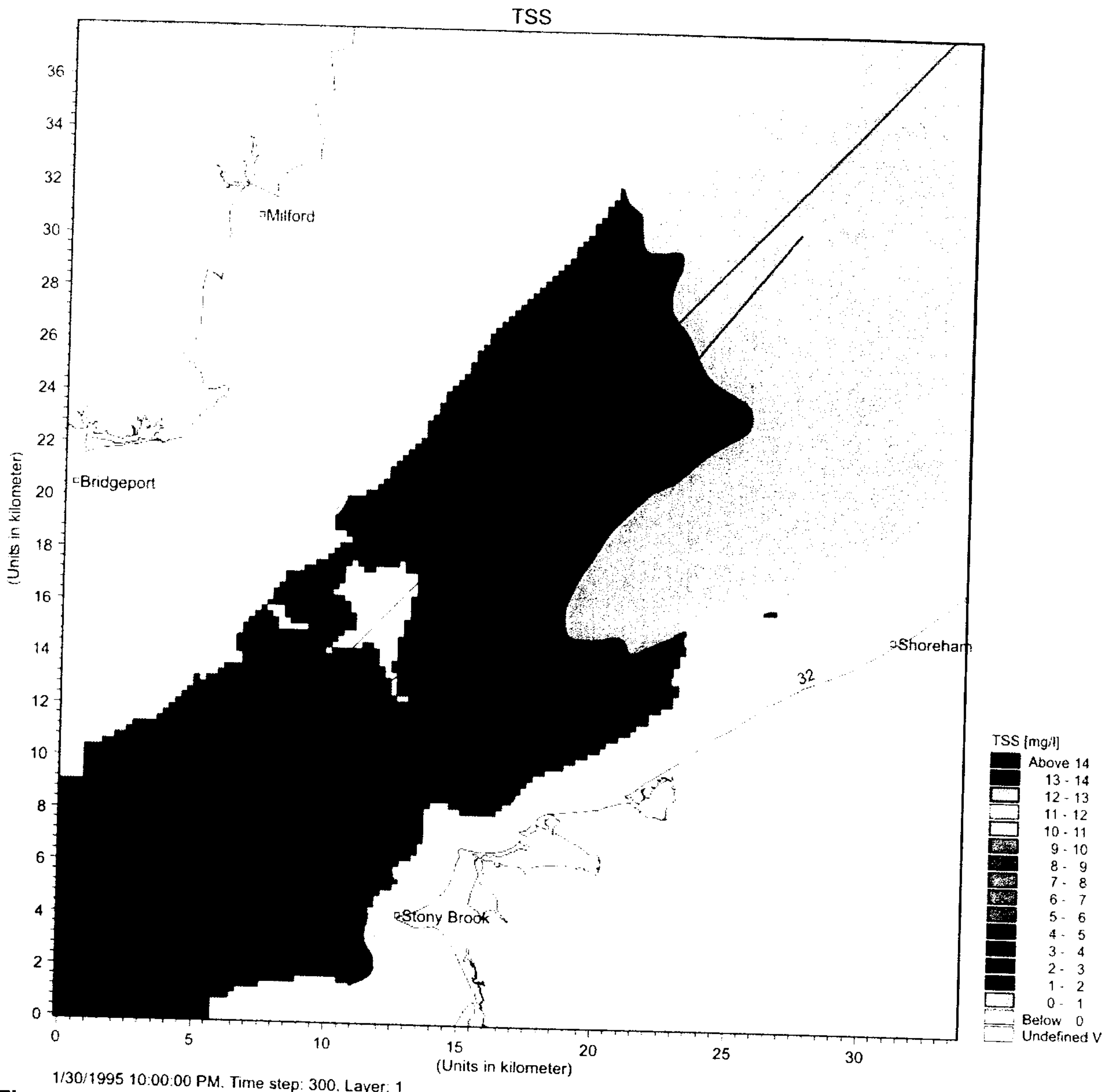

Figure 78 Bottom at Timestep = 300 (28 hours after end of plowing)

Part 2

Response to January 18, 2006, Environmental Information Request, Resource Report No. 3, Question 2

2. Report the ichthyoplankton densities, potential annual entrainment, and standing crop by species and lifestage for the intermediate water depth based on the Polatti ichthyoplankton program. Present results in absolute numbers as well as Age 1 equivalents. Identify any mitigation measures that Broadwater proposes to minimize impacts to ichthyoplankton (FSRU and LNG carrier).

The attached report presents the results of the analyses of the intermediate water depth sampling conducted as part of the Poletti Project.

SUPPLEMENTAL FERC ENVIRONMENTAL INFORMATION REQUEST

Entrainment and Age-1 Equivalent Estimates Based On the Intermediate and Deep Sampling Strata of the 2002 Poletti Ichthyoplankton Program

The 2002 Poletti Ichthyoplankton Program data subset to represent the proposed FSRU location included Regions 7-9 to represent the Central Basin of Long Island Sound (Figure 1), sampling gear was restricted to the Tucker trawl to represent the seawater intake from 35-45 feet below surface, and depth strata was restricted to deep (> 30 m or 98 ft) to represent the FSRU location 9 miles offshore of Long Island in water that is approximately 95 ft (29 m) deep. The intermediate depth strata includes water depths ranging from 6-30 m (20-98 ft), and this sampling strata also represents the FSRU location at the upper end of its depth range. However, it was not possible to include individual samples collected from water depths approximating the FSRU location due to compositing the samples in the laboratory (Section 4.1). Because the composite samples from the intermediate depth strata may include individual samples from water as shallow as 6 m they were not considered as representative of the FSRU location as the deep sampling strata. However, entrainment estimates derived from the intermediate depth strata may provide an upper bound of entrainment impacts by including these more productive, shallow waters in the analysis.

One hundred and eighteen individual samples were included in the laboratory composites of the Tucker trawl collections in the deep sampling strata of Regions 7-9 during the 11 biweekly surveys of the Poletti Ichthyoplankton Program, 232 samples were included in the laboratory composites of the intermediate depth sampling strata in the same regions and gear subset (Table 2). Community composition and dominant species were similar between the Tucker trawl collections in the two depth strata, however ichthyoplankton density was generally higher in the intermediate depth strata (Figure 1). Egg collections for both the intermediate and deep strata were dominated by fourbeard rockling during surveys 1-5 (March 4-May 12). During survey 6 (May 13-May 26) there was a large pulse of Atlantic menhaden eggs collected in the intermediate depth strata that was largely absent in the deep strata. The larval assemblage between the two depth strata was also similar, although densities were generally higher in the intermediate depth strata. In both depth strata, density of eggs and larvae dropped significantly during the last two surveys in July.

The average density, standing crop, and entrainment estimates for each species and lifestage during each biweekly survey are presented for the Intermediate depth strata in Table 1 and in the Deep depth strata in Table 2. Standing crop estimates were derived by multiplying the mean egg or larval fish density by the volume of water in either the Intermediate or Deep strata of Regions 7-9 from the surface to 3 m above bottom (as described in Section 7.0 of Appendix E to Resource Report No. 3). Daily entrainment estimates were derived by multiplying the mean ichthyoplankton density (#/m^3) by the facility's average daily water intake (28.2 MGD, 106,750m^3/day) and this value was multiplied by 14 to represent the number entrained in a biweekly survey as previously described. Entrainment estimates for fish eggs and larvae summed over all eleven biweekly surveys (March 4-August 5, 2002) by species and lifestage for the Intermediate and Deep depth strata is presented in Table 3. The two different entrainment scenarios applied to the Poletti data based on diel differences for bay anchovy eggs and larvae and fourspot flounder larvae (*see* Appendix A to Resource Report No. 3, Appendix E) have been applied. In order to evaluate entrainment beyond the March-July Poletti sampling window, entrainment estimates from the site specific, 2005 data collected in August and October was added to the Poletti estimates for selected species (Table 4). The entrainment estimates in Table 4 represent the period from March through October based on the combination of the Poletti (March 4-August 5, 2002) and the site specific (August 6-October 31, 2005) data (*see* Appendix B to Appendix E to Resource Report No. 3, .

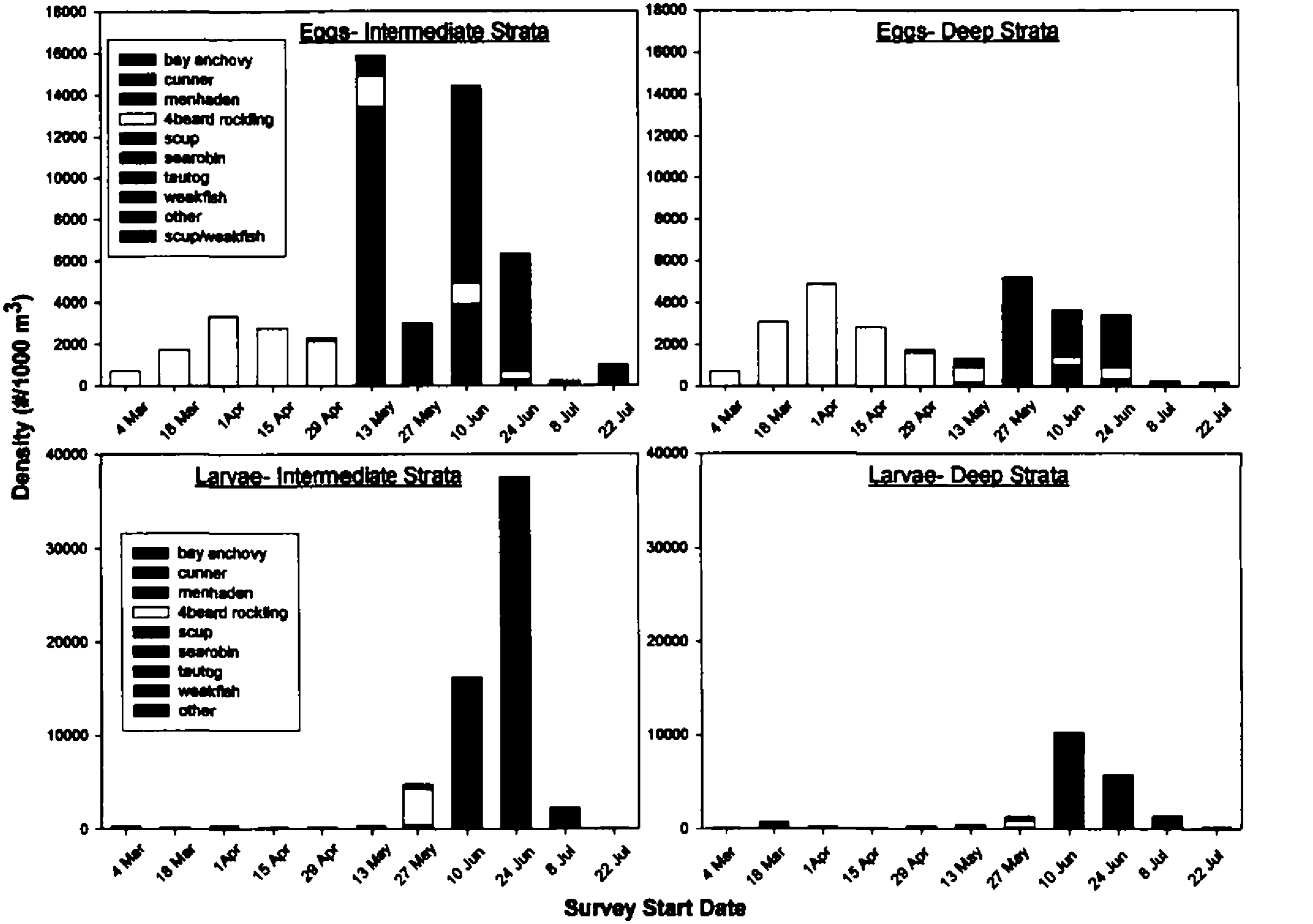

Figure 1. Average fish egg and larvae density (#/1000m^3) and species composition from Tucker trawl collections in both the Intermediate (6-30m) and Deep (>30m) depth strata in Regions 7-9 during each biweekly survey of the 2002 Poletti Ichthyoplankton Program.

Table 1. **Mean biweekly ichthyoplankton density, standing crop (in millions) and estimated number entrained by species and lifestage derived from the Tucker trawl collections from the Intermediate (6-30m) depth strata in Regions 7,8,9 of the 2002 Poletti Ichthyoplankton Program.**

Survey	Common name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
1 (March 4-March 17)	4-Bearded rockling	Eggs	17764.7	685.3	1,024,181
	American sandlance	Larvae	5708.2	220.2	329,089
	Grubby	Larvae	207.2	8	11,956
	Windowpane	Eggs	25	1	1,495
	Winter flounder	Larvae	732.5	28.3	42,294
2 (March 18-March 31)	4-Bearded rockling	Eggs	44330.3	1710.2	2,555,894
		Larvae	22	0.9	1,345
	American sandlance	Larvae	1610.9	62.1	92,808
	Atlantic menhaden	Larvae	27.3	1.1	1,644
	Grubby	Larvae	264.2	10.2	15,244
	Winter flounder	Larvae	1924.3	74.2	110,892
3 (April 1-April 14)	4-Bearded rockling	Eggs	85595.1	3302.2	4,935,138
	American sandlance	Larvae	2074.4	80	119,560
	Atlantic herring	Larvae	5.4	0.2	299
	Atlantic menhaden	Larvae	5.4	0.2	299
	Grubby	Larvae	373.7	14.4	21,521
	Rock gunnel	Larvae	5.4	0.2	299
	Unidentifiable	Eggs	158	6.1	9,116
	Windowpane	Eggs	291.6	11.3	16,888
	Winter flounder	Eggs	16.2	0.6	897
		Larvae	5948.3	229.5	342,988
4 (April 15-April 28)	4-Bearded rockling	Eggs	70978.3	2738.3	4,092,389
		Larvae	506.5	19.5	29,143
	American sandlance	Larvae	110.3	4.3	6,426
		YOY	14.2	0.5	747
	Atlantic cod	Larvae	7.9	0.3	448
	Grubby	Larvae	99.3	3.8	5,679
	Windowpane	Eggs	943.6	36.4	54,400
	Winter flounder	Larvae	3324.8	128.3	191,744
5 (April 29-May 12)	4-Bearded rockling	Eggs	54385.6	2098.2	3,135,760
		Larvae	1937.5	74.7	111,639
	American sandlance	Larvae	85.8	3.3	4,932
	Atlantic mackerel	Eggs	904.7	34.9	52,158
	Bay anchovy	Eggs	100.5	3.9	5,829
	Cunner	Eggs	402.1	15.5	23,165
	Grubby	Larvae	11.7	0.5	747
	Tautog	Eggs	603.2	23.3	34,822
	Unidentifiable	Eggs	301.6	11.6	17,336
	Windowpane	Eggs	3963.3	152.9	228,509
		Larvae	114.7	4.4	6,576
	Winter flounder	Larvae	2417.8	93.3	139,437

(continued)

Table 1. (Continued)

Survey	Common name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
6 (May 13-May 26)	4-bearded rockling	Eggs	37817.2	1459	2,180,476
		Larvae	5860	226.1	337,906
	American lobster	Larvae	60.3	2.3	3,437
	American sandlance	Larvae	11.3	0.4	598
	Atlantic mackerel	Larvae	123.4	4.8	7,174
	Atlantic menhaden	Eggs	347171.7	13393.6	20,016,735
		Larvae	564.4	21.8	32,580
	Cod	Eggs	538.7	20.8	31,086
	Cunner	Eggs	578.5	22.3	33,327
	Sea robin	Eggs	2024.9	78.1	116,720
	Tautog	Eggs	11800.2	455.2	680,296
	Unidentifiable	Larvae	11.3	0.4	598
	Weakfish/scup	Eggs	2699.9	104.2	155,727
	Windowpane	Eggs	8879.9	342.6	512,016
		Larvae	1195.2	46.1	68,896
	Winter flounder	Larvae	1935.2	74.7	111,639
7 (May 27-June 9)	4-Bearded rockling	Eggs	221.9	8.6	12,853
		Larvae	98012.7	3781.3	5,651,153
	American lobster	Larvae	532.1	20.5	30,637
	Atlantic mackerel	Larvae	1098.6	42.4	63,367
	Atlantic menhaden	Eggs	23026.6	888.3	1,327,564
		Larvae	9988.4	385.3	575,831
	Bay anchovy	Eggs	221.9	8.6	12,853
	Cunner	Eggs	6984.4	269.5	402,768
		Larvae	1399.7	54	80,703
	Sea robin	Eggs	20744	800.3	1,196,048
	Tautog	Eggs	8668.5	334.4	499,761
		Larvae	2626.2	101.3	151,393
	Weakfish	Larvae	1331.4	51.4	76,817
	Weakfish/scup	Eggs	451.9	17.4	26,004
	Windowpane	Eggs	17123.2	660.6	987,267
		Larvae	9059.8	349.5	522,328
	Winter flounder	Larvae	451.9	17.4	26,004

(continued)

Table 1. (Continued)

Survey	Common name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
8 (June 10-June 23)	4-Bearded rockling	Eggs	25382	979.2	1,463,414
		Larvae	2245.6	86.6	129,424
	American lobster	Larvae	78.4	3	4,484
	Atlantic menhaden	Eggs	25407.4	980.2	1,464,909
		Larvae	231240.7	8921.1	13,332,584
	Bay anchovy	Eggs	30703.4	1184.5	1,770,235
		Larvae	497.9	19.2	28,694
	Butterfish	Eggs	2182.4	84.2	125,837
		Larvae	6633.1	255.9	382,443
	Cunner	Eggs	45583.2	1758.6	2,628,228
		Larvae	19298	744.5	1,112,655
	Fourspot flounder	Larvae	2168.9	83.7	125,090
	Northern porgy or scup	Larvae	58846.1	2270.2	3,392,814
	Sea robin	Eggs	28328.4	1092.9	1,633,339
		Larvae	17262.7	666	995,337
	Striped anchovy	Eggs	1263.4	48.7	72,782
	Tautog	Eggs	81352.7	3138.5	4,690,488
		Larvae	73799.5	2847.1	4,254,991
	Unidentifiable	Larvae	3369	130	194,285
	Weakfish/scup	Eggs	132285.3	5103.5	7,627,181
	Windowpane	Eggs	2603.5	100.4	150,048
		Larvae	9340.4	360.3	538,468
9 (June 24-July 7)	4-bearded rockling	Eggs	9529.2	367.6	549,378
	American lobster	Larvae	108.7	4.2	6,277
	Atlantic menhaden	Eggs	475.3	18.3	27,349
		Larvae	279286.9	10774.7	16,102,789
	Bay anchovy	Eggs	4419.8	170.5	254,812
		Larvae	11103.8	428.4	640,244
	Black sea bass	Larvae	1267.5	48.9	73,081
	Butterfish	Eggs	4696.4	181.2	270,803
		Larvae	62593.5	2414.8	3,608,919
	Cunner	Eggs	2766.5	106.7	159,463
		Larvae	164341.2	6340.2	9,475,429
	Fourspot flounder	Larvae	6185.7	238.6	356,588
	Gobiidae	Larvae	2535.1	97.8	146,162
	Hogchoker	Eggs	633.8	24.5	36,615
	Northern porgy or scup	Larvae	301917	11647.7	17,407,488
	Sea robin	Eggs	93496	3607	5,390,662
		Larvae	15369.5	592.9	886,089
	Tautog	Eggs	13543.2	522.5	780,876
		Larvae	120996.2	4667.9	6,976,177
	Weakfish	Larvae	11103.8	428.4	640,244
	Weakfish/scup	Eggs	34187.3	1318.9	1,971,096
	Windowpane	Eggs	228.2	8.8	13,152
		Larvae	6185.7	238.6	356,588

(continued)

Table 1. (Continued)

Survey	Common name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
10 (July 8-July 21)	4-Bearded rockling	Eggs	1521.7	58.7	87,727
	American lobster	Larvae	47.3	1.8	2,690
	Atlantic menhaden	Larvae	31617.5	1219.8	1,822,991
	Bay anchovy	Eggs	513.7	19.8	29,591
		Larvae	11693.1	451.1	674,169
	Butterfish	Eggs	594.1	22.9	34,224
		Larvae	1098.8	42.4	63,367
	Cunner	Eggs	129.7	5	7,473
		Larvae	3900.6	150.5	224,922
		YOY	3114.8	120.2	179,639
	Fourspot flounder	Larvae	1038.2	40.1	59,929
	Gobiidae	Larvae	1675.9	64.7	96,694
	Hogchoker	Eggs	66.3	2.6	3,886
		Larvae	55.5	2.1	3,138
	Northern pipefish	Larvae	55.5	2.1	3,138
	Northern porgy or scup	Larvae	3266.1	126	188,307
		YOY	272.6	10.5	15,692
	Sea robin	Eggs	1276.9	49.3	73,679
		Larvae	1610.3	62.1	92,808
	Striped searobin	YOY	429.1	16.6	24,809
	Tautog	Eggs	650.2	25.1	37,512
		Larvae	2986.7	115.2	172,166
	Weakfish	Larvae	932.2	36	53,802
	Weakfish/scup	Eggs	569.2	22	32,879
	Windowpane	Eggs	433.3	16.7	24,958
		Larvae	106	4.1	6,127
11 (July 22-August 5)	4-Bearded rockling	Eggs	3239.2	125	186,813
	Atlantic menhaden	Larvae	495	19.1	28,545
	Bay anchovy	Eggs	11703.6	451.5	674,767
		Larvae	1400.2	54	80,703
	Butterfish	Eggs	2135.5	82.4	123,147
		Larvae	30.6	1.2	1,793
		YOY	114.3	4.4	6,576
	Cunner	Larvae	24	0.9	1,345
		YOY	1082.7	41.8	62,470
	Feather blenny	Larvae	24	0.9	1,345
	Fourspot flounder	Larvae	6.6	0.3	448
	Gobiidae	Larvae	353.5	13.6	20,325
	Northern pipefish	Larvae	20.2	0.8	1,196
		YOY	19.7	0.8	1,196
	Northern porgy or scup	Larvae	276	10.6	15,842
		YOY	212.2	8.2	12,255
	Sea robin	Eggs	1348.5	52	77,714
	Smallmouth flounder	Larvae	19.7	0.8	1,196
	Striped searobin	YOY	24	0.9	1,345
	Tautog	Eggs	6329.6	244.2	364,957
	Weakfish/scup	Eggs	683.8	26.4	39,455
	Windowpane	Eggs	550.9	21.3	31,833

Table 2. **Mean biweekly ichthyoplankton density, standing crop (in millions) and estimated number entrained by species and lifestage derived from the Tucker trawl collections from the Deep (>30m) depth strata in Regions 7,8,9 of the 2002 Poletti Ichthyoplankton Program.**

Survey	Common Name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
1 (March 4-March 17)	Fourbeard rockling	Eggs	5222.2	693.9	1,037,034
	American sandlance	Larvae	616.1	81.9	122,400
	Grubby	Larvae	13.9	1.8	2,690
	Rock gunnel	Larvae	4.6	0.6	897
	Windowpane	Eggs	18.5	2.5	3,736
	Winter flounder	Eggs	25.7	3.4	5,081
		Larvae	68	9	13,451
2 (March 18-March 31)	Fourbeard rockling	Eggs	23038	3061	4,574,665
	American sandlance	Larvae	1048.9	139.4	208,333
	Grubby	Larvae	70.3	9.3	13,899
	Rock gunnel	Larvae	6.9	0.9	1,345
	Windowpane	Eggs	66.2	8.8	13,152
	Winter flounder	Larvae	3812.2	506.5	756,964
3 (April 1-April 14)	Fourbeard rockling	Eggs	36560.1	4857.7	7,259,833
		Larvae	7.7	1	1,495
	American sandlance	Larvae	273.3	36.3	54,250
	Grubby	Larvae	61	8.1	12,105
	Windowpane	Eggs	159.9	21.3	31,833
	Winter flounder	Larvae	804.7	106.9	159,762
	Yellowtail flounder	Eggs	7.9	1.1	1,644
4 (April 15-April 28)	Fourbeard rockling	Eggs	21150.5	2810.2	4,199,844
		Larvae	66	8.8	13,152
	American sandlance	Larvae	22.4	3	4,484
	Bay anchovy	Larvae	6.3	0.8	1,196
	Grubby	Larvae	63.2	8.4	12,554
	Striped cusk-eel	Larvae	6.3	0.8	1,196
	Winter flounder	Larvae	547.7	72.8	108,800
5 (April 29-May 12)	Fourbeard rockling	Eggs	12094	1606.9	2,401,512
		Larvae	724.8	96.3	143,920
	American sandlance	Larvae	9.3	1.2	1,793
	Atlantic mackerel	Eggs	114.3	15.2	22,716
	Tautog	Eggs	20.2	2.7	4,035
	Windowpane	Eggs	992.6	131.9	197,125
		Larvae	6.7	0.9	1,345
	Winter flounder	Larvae	1125	149.5	223,428

(continued)

Table 2. (Continued)

Survey	Common Name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
6 (May 13-May 26)	Fourbeard rockling	Eggs	5022.5	667.3	997,280
		Larvae	1566	208.1	311,005
	American lobster	Larvae	10.8	1.4	2,092
	Atlantic mackerel	Larvae	90.2	12	17,934
	Atlantic menhaden	Eggs	1482.3	197	294,417
	Cunner	Eggs	292.5	38.9	58,136
	Grubby	Larvae	8.6	1.1	1,644
	Sea robin	Eggs	274.9	36.5	54,549
	Tautog	Eggs	1443.2	191.8	286,645
		Larvae	8.6	1.1	1,644
	Weakfish/scup	Eggs	344.8	45.8	68,448
	Windowpane	Eggs	1195	158.8	237,327
		Larvae	726.2	96.5	144,219
	Winter flounder	Larvae	597.6	79.4	118,663
7 (May 27-June 9)	Fourbeard rockling	Eggs	49	6.5	9,714
		Larvae	5067.2	673.3	1,006,247
	American lobster	Larvae	92	12.2	18,233
	Atlantic mackerel	Larvae	343.3	45.6	68,149
	Atlantic menhaden	Eggs	3835.7	509.6	761,597
		Larvae	1323.8	175.9	262,883
	Bay anchovy	Eggs	98.1	13	19,429
	Butterfish	Eggs	49	6.5	9,714
	Cunner	Eggs	4756.7	632	944,524
		Larvae	147.1	19.5	29,143
	Herrings	Larvae	61.2	8.1	12,105
	Sea robin	Eggs	1732.5	230.2	344,034
	Tautog	Eggs	16966.2	2254.3	3,369,051
		Larvae	629.3	83.6	124,940
	Weakfish/scup	Eggs	8071.3	1072.4	1,602,702
	Windowpane	Eggs	3513.6	466.8	697,633
		Larvae	2194	291.5	435,647
	Winter flounder	Larvae	112.3	14.9	22,268

(continued)

Table 2. (Continued)

Survey	Common Name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
8 (June 10- June 23)	Fourbeard rockling	Eggs	2753.2	365.8	546,688
		Larvae	179.9	23.9	35,719
	American lobster	Larvae	9.2	1.2	1,793
	Atlantic menhaden	Eggs	2817	374.3	559,391
		Larvae	43151.9	5733.5	8,568,716
	Bay anchovy	Eggs	1945.9	258.5	386,328
	Butterfish	Eggs	183.8	24.4	36,466
		Larvae	220.5	29.3	43,789
	Cunner	Eggs	3006.1	399.4	596,903
		Larvae	8888.5	1181	1,765,005
	Fourspot flounder	Larvae	336.7	44.7	66,804
	Northern pipefish	Larvae	8.2	1.1	1,644
	Scup	Larvae	4922.1	654	977,403
	Sea robin	Eggs	7191.9	955.6	1,428,144
		Larvae	4628	614.9	918,968
	Tautog	Eggs	5031.1	668.5	999,073
		Larvae	12421.3	1650.4	2,466,523
	Weakfish	Larvae	1549.2	205.8	307,568
	Weakfish/scup	Eggs	3070.3	407.9	609,607
	Windowpane	Eggs	1383.4	183.8	274,689
		Larvae	1106.6	147	219,692
9 (June 24-July 7)	Fourbeard rockling	Eggs	4350.4	578	863,821
	American lobster	Larvae	94.4	12.5	18,681
	Atlantic menhaden	Larvae	20772.3	2760	4,124,820
	Bay anchovy	Eggs	743.6	98.8	147,657
		Larvae	1445.5	192.1	287,093
	Butterfish	Eggs	302.3	40.2	60,079
		Larvae	707.9	94.1	140,632
	Cunner	Eggs	1844.7	245.1	366,302
		Larvae	2845.2	378	564,921
	Fourspot flounder	Larvae	294	39.1	58,435
	Gobiidae	Larvae	65.4	8.7	13,002
	Herrings	Larvae	55	7.3	10,910
	Scup	Larvae	5712.7	759	1,134,326
	Sea robin	Eggs	9086.2	1207.3	1,804,310
		Larvae	490.4	65.2	97,441
	Tautog	Eggs	5143.4	683.4	1,021,341
		Larvae	6489.4	862.2	1,288,558
	Unidentifiable	Larvae	18.3	2.4	3,587
	Weakfish	Larvae	3829.7	508.8	760,402
	Weakfish/scup	Eggs	3589.7	477	712,877
	Windowpane	Eggs	334.8	44.5	66,505
		Larvae	236.8	31.5	47,077

(continued)

Table 2. (Continued)

Survey	Common Name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
10 (July 8-July 21)	Fourbeard rockling	Eggs	110	14.6	21,820
	American lobster	Larvae	13.4	1.8	2,690
	Atlantic menhaden	Larvae	4164.7	553.4	827,056
	Atlantic silverside	Larvae	23.1	3.1	4,633
	Bay anchovy	Eggs	19.4	2.6	3,886
		Larvae	2974.2	395.2	590,626
	Butterfish	Eggs	173	23	34,374
		Larvae	152.2	20.2	30,189
		YOY	74.5	9.9	14,796
	Cunner	Eggs	133.3	17.7	26,453
		Larvae	1888.5	250.9	374,970
		YOY	138.4	18.4	27,499
	Feather blenny	Larvae	23.1	3.1	4,633
	Fourspot flounder	Larvae	42.9	5.7	8,519
	Gobiidae	Larvae	100.8	13.4	20,026
	Hogchoker	Eggs	187.3	24.9	37,213
	Northern pipefish	Larvae	25.5	3.4	5,081
	Scup	Larvae	391.5	52	77,714
	Sea robin	Eggs	70.7	9.4	14,048
		Larvae	94.3	12.5	18,681
	Striped searobin	YOY	23.1	3.1	4,633
	Tautog	Eggs	912.3	121.2	181,133
		Larvae	151.1	20.1	30,039
	Unidentifiable	Larvae	46.1	6.1	9,116
	Weakfish	Larvae	85.5	11.4	17,037
	Weakfish/scup	Eggs	129.2	17.2	25,705
	Windowpane	Eggs	25.7	3.4	5,081
		Larvae	23.1	3.1	4,633
	Winter flounder	Larvae	8.5	1.1	1,644

(continued)

Table 2. (Continued)

Survey	Common Name	Life Stage	Standing Crop (millions)	Density (# /1000m³)	# Entrained
11 (July 22-August 5)	Fourbeard rockling	Eggs	246.1	32.7	48,870
	Atlantic menhaden	Larvae	189.2	25.1	37,512
	Bay anchovy	Eggs	127.1	16.9	25,257
		Larvae	143.9	19.1	28,545
	Black sea bass	Larvae	21.7	2.9	4,334
	Butterfish	Eggs	42.8	5.7	8,519
		Larvae	42.4	5.6	8,369
		YOY	61.8	8.2	12,255
	Cunner	Eggs	248.1	33	49,319
		Larvae	7.2	1	1,495
		YOY	34.2	4.6	6,875
	Feather blenny	Larvae	17.1	2.3	3,437
	Fourspot flounder	Larvae	2.4	0.3	448
	Gobiidae	Larvae	702.6	93.4	139,586
	Northern pipefish	Larvae	11	1.5	2,242
	Scup	Larvae	118.2	15.7	23,464
		YOY	8.6	1.1	1,644
	Sea robin	Eggs	390.8	51.9	77,565
		Larvae	9.6	1.3	1,943
	Smallmouth flounder	Larvae	15.8	2.1	3,138
	Tautog	Eggs	306.3	40.7	60,826
	Weakfish	Larvae	8.6	1.1	1,644
	Weakfish/scup	Eggs	9.7	1.3	1,943
	Windowpane	Eggs	131.9	17.5	26,154

Table 3. **Egg and larvae entrainment estimates by species summed over all eleven biweekly surveys of the 2002 Poletti Ichthyoplankton Program (Mar. 4-Aug. 5) in the Intermediate (6-30m) and Deep (> 30m) depth strata under two different entrainment scenarios. Scenario 1 is based on the unadjusted Poletti data (Regions 7-9, Tucker trawl). In scenario 2, bay anchovy eggs and larvae and fourspot flounder larvae have been adjusted for day:night differences.**

	Egg Entrainment Estimates				Larvae Entrainment Estimates			
	Intermediate Depth Strata		Deep Depth Strata		Intermediate Depth Strata		Deep Depth Strata	
	Entrainment Scenario		Entrainment Scenario		Entrainment Scenario		Entrainment Scenario	
Species	1	2	1	2	1	2	1	2
American lobster	0	0	0	0	47,525	47,525	43,490	43,490
American sandlance	0	0	0	0	553,413	553,413	391,260	391,260
Atlantic herring	0	0	0	0	299	299	0	0
Atlantic mackerel	52,158	52,158	22,716	22,716	70,540	70,540	86,083	86,083
Atlantic menhaden	22,836,558	22,836,558	1,615,405	1,615,405	31,897,263	31,897,263	13,820,987	13,820,987
Atlantic silverside	0	0	0	0	0	0	4,633	4,633
Bay anchovy	2,748,087	18,137,372	582,556	3,844,870	1,423,810	18,367,151	907,460	11,706,239
Black seabass	0	0	0	0	73,081	73,081	4,334	4,334
Butterfish	554,011	554,011	149,151	149,151	4,056,521	4,056,521	222,979	222,979
Cod (Family)	31,086	31,086	0	0	448	448	0	0
Cunner	3,254,423	3,254,423	2,041,636	2,041,636	10,895,054	10,895,054	2,735,533	2,735,533
Feather blenny	0	0	0	0	1,345	1,345	8,070	8,070
Fourbeard rockling	20,224,022	20,224,022	21,961,080	21,961,080	6,260,610	6,260,610	1,511,537	1,511,537
Fourspot flounder	0	0	0	0	542,055	1,246,727	134,206	308,674
Gobiidae	0	0	0	0	263,181	263,181	172,615	172,615
Grubby	0	0	0	0	55,147	55,147	42,892	42,892
Herrings	0	0	0	0	0	0	23,015	23,015
Hogchoker	40,501	40,501	37,213	37,213	3,138	3,138	0	0
Northern pipefish	0	0	0	0	4,334	4,334	8,967	8,967
Rock gunnel	0	0	0	0	299	299	2,242	2,242
Scup	9,490,761	9,490,761	1,963,833	1,963,833	21,004,450	21,004,450	2,212,906	2,212,906
Searobin	8,488,162	8,488,162	3,722,650	3,722,650	1,974,235	1,974,235	1,037,034	1,037,034
Smallmouth flounder	0	0	0	0	1,196	1,196	3,138	3,138
Striped anchovy	72,782	72,782	0	0	0	0	0	
Striped cusk-eel	0	0	0	0	0	0	1,196	1,196
Tautog	7,088,712	7,088,712	5,922,106	5,922,106	11,554,727	11,554,727	3,911,704	3,911,704
Unidentified	26,453	26,453	0	0	194,883	194,883	12,703	12,703
Weakfish	361,581	361,581	1,057,448	1,057,448	770,863	770,863	1,086,651	1,086,651
Windowpane	2,020,564	2,020,564	1,553,234	1,553,234	1,498,984	1,498,984	852,612	852,612
Winter flounder	897	897	5,081	5,081	964,999	964,999	1,404,979	1,404,979
Yellowtail flounder	0	0	1,644	1,644	0	0	0	0
Sum (Mar 4-Aug 5)[a]	**77,290,758**	**92,680,043**	**40,635,753**	**43,898,067**	**94,112,401**	**111,760,413**	**30,643,226**	**41,616,473**

[a] Sum of entrainment derived from the 2002 Poletti data summed over the March 4-August 5 sampling window.

Table 4. Egg and larvae entrainment estimates for selected species summed over all eleven biweekly surveys of the 2002 Poletti Ichthyoplankton Program (Mar. 4-Aug. 5) and during the site specific collections in August and October 2005 under the three different entrainment scenarios. Scenario 1 is based on the unadjusted Poletti data and the site specific data is the average of day and night collections. In scenario 2, Poletti estimates for bay anchovy eggs and larvae and fourspot flounder larvae have been adjusted for day:night differences, and bay anchovy and fourspot flounder larval estimates are based only on night samples for the site specific data. Scenario 3 is the same as # 2 except only night collections were used for all larval estimates for the site specific 2005 data. These entrainment estimates represent sums of the period from March 4-August 5 (2002 Poletti data) and August 6-October 31 (site specific 2005 data).

	Egg Entrainment Estimates						Larvae Entrainment Estimates					
	Intermediate Depth Strata			Deep Depth Strata			Intermediate Depth Strata			Deep Depth Strata		
	Entrainment Scenario			Entrainment Scenario			Entrainment Scenario			Entrainment Scenario		
Species	1	2	3	1	2	3	1	2	3	1	2	3
American Sandlance	0	0	0	0	0	0	553,413	553,413	553,413	391,260	391,260	391,260
Atlantic Mackerel	52,158	52,158	52,158	22,716	22,716	22,716	248,599	248,599	426,231	264,142	264,142	441,774
Atlantic Menhaden	23,117,577	23,117,577	23,117,577	1,896,424	1,896,424	1,896,424	32,125,441	32,125,441	32,125,441	14,049,165	14,049,165	14,049,165
Bay Anchovy	4,662,328	20,051,613	20,051,613	2,496,797	5,759,111	5,759,111	25,318,036	62,015,305	62,015,305	24,801,686	55,354,393	55,354,393
Butterfish	800,884	800,884	800,884	396,024	396,024	396,024	4,937,209	4,937,209	5,057,302	1,103,667	1,103,667	1,223,760
Cunner	3,254,423	3,254,423	3,254,423	2,041,636	2,041,636	2,041,636	10,980,454	10,980,454	11,023,154	2,820,933	2,820,933	2,863,633
Fourbeard Rockling	20,224,022	20,224,022	20,224,022	21,961,080	21,961,080	21,961,080	6,260,610	6,260,610	6,260,610	1,511,537	1,511,537	1,511,537
Fourspot Flounder	0	0	0	0	0	0	1,075,805	1,873,136	1,873,136	667,956	935,083	935,083
Grubby	0	0	0	0	0	0	55,147	55,147	55,147	42,892	42,892	42,892
Rock Gunnel	0	0	0	0	0	0	299	299	299	2,242	2,242	2,242
Scup	9,490,761	9,490,761	9,490,761	1,963,833	1,963,833	1,963,833	21,004,450	21,004,450	21,004,450	2,212,906	2,212,906	2,212,906
Searobin	8,794,193	8,794,193	8,794,193	4,028,681	4,028,681	4,028,681	2,991,776	2,991,776	2,814,144	2,054,575	2,054,575	1,876,943
Smallmouth Flounder	683,200	683,200	683,200	683,200	683,200	683,200	2,406,487	2,406,487	2,947,496	2,408,429	2,408,429	2,949,438
Tautog	7,088,712	7,088,712	7,088,712	5,922,106	5,922,106	5,922,106	11,554,727	11,554,727	11,554,727	3,911,704	3,911,704	3,911,704
Weakfish	361,581	361,581	361,581	1,057,448	1,057,448	1,057,448	806,304	806,304	770,863	1,122,092	1,122,092	1,086,651
Windowpane	2,020,564	2,020,564	2,020,564	1,553,234	1,553,234	1,553,234	1,513,075	1,513,075	1,498,984	866,703	866,703	852,612
Winter flounder	897	897	897	5,081	5,081	5,081	964,999	964,999	964,999	1,404,979	1,404,979	1,404,979
SUM	80,551,301	95,940,588	95,940,588	44,028,261	47,290,576	47,290,577	122,796,832	160,291,433	160,945,704	59,636,869	90,456,704	91,110,975
SUM (millions)	80.55	95.94	95.94	44.03	47.29	47.29	122.80	160.29	160.95	59.64	90.46	91.11

The selected species in Table 4 account for > 99% of the entrained eggs and larvae in both the intermediate and deep depth strata of the Poletti Program data.

Entrainment estimates from Table 4 were expressed in terms of Age 1 fish using the Equivalent Adult Model. The Equivalent Adult Model (EAM) is a method for expressing entrainment losses as an equivalent number of individuals at some other common life stage, referred to as the age of equivalency (Goodyear 1978). The method provides a convenient means of converting losses of fish eggs and larvae into units of individual fish and provides a standard metric for comparing losses among species, years, and facilities (EPA 2004). The age of equivalency can be any life stage of interest. For the 316 (b) cooling water intake case studies, EPA (2004) expressed impingement and entrainment losses as an equivalent number of Age 1 individuals (the Age 1 fish considered in this analysis are typically less than 7 inches in total length).

The EAM calculation requires life-stage specific entrainment counts and life-stage specific mortality rates from the life stage of entrainment to the life stage of equivalence. The losses at any given stage are multiplied by the fraction of fish at that stage or age that would be expected to survive to the age of equivalence (Age-1):

$$EA = S_A N$$

Where: EA = equivalent age 1 loss, N= number of fish lost due to entrainment, S_A= fraction of fish expected to survive from the age at which they are entrained to the age of equivalence.

Survival rates of early life stages of fish are often expressed on a life-stage specific basis so that the fraction surviving from any particular life stage to the age of equivalency is expressed as the cumulative product of survival fractions for all of the life stages through which a fish must pass before reaching the age of equivalency. One of the benefits of this model is that it can be used to express losses imposed on different lifestages in common equivalent units.

$$EA = \quad S_{i,a} N_i$$

Where:

N_i= number of fish lost at age i

$S_{i,a}$= fraction of fish expected to survive from age i to the age of equivalence

The probability that a fish entrained at any given life stage would have survived to the age of equivalence is greater if the fish is near the end of that stage than if it at the beginning of the stage, because it would have already survived most of the natural mortality that occurs during that stage. Therefore, to find the expected survival rate from the day that a fish is entrained until the time that it would have passed into the subsequent age, an adjustment to S_i is required. The adjusted rate S^*_i describes the effective survival rate for the group of fish entrained at stage i considering the fact that the individual fish were entrained at various ages within stage i. This adjustment is applied only to the stage at which entrainment occurs, the unadjusted survival rate would be applied to subsequent lifestages until the age of equivalency.

$S^*_i = 2S_i e^{-\ln(1+Si)}$ (EPRI 2003, EPA 2004)

Site specific or even Long Island Sound specific mortality rates for species and life stages of interest collected in this survey are not available. However, EA models do not require site-specific data and they can be applied for any water withdrawal application for which entrainment losses can be estimated (EPRI 2003). However, this model is highly sensitive to uncertainties in input parameter values which are often highly variable as reported in the literature, particularly for marine fish species. The use of poorly known life history parameters to project fish abundance may result in estimates with wide bounds of uncertainty, although several assumptions in the EA model produce conservative estimates.

It is assumed that 100% mortality occurs for all entrained fish eggs and larvae, based on a conservative approach resulting from the absence of specific information concerning entrainment mortalities. Experience at power plants with once through cooling has shown mortalities of entrained fish and eggs and larvae may be substantially less than 100% (EPRI 2000, EPA 2002). These assessments have shown that entrainment mortality rates for fish eggs and larvae are highly dependent on species, lifestage, plant operating characteristics and discharge temperature. However, in many cases, individual survival rates for entrained ichthyoplankton have been documented at 20 to > 90%. It is also assumed that there was no active avoidance of the intake by fish larvae. Actual entrainment may be reduced by active avoidance of the seawater intake. For example, Zeitoun et al. (1981) estimated that 90% of fish larvae in a Lake Michigan study avoided entrainment at intake velocities similar to the proposed FSRU facility (0.5 ft/sec). Another significant conservative assumption is that no density-dependent compensation occurred among non-entrained individuals, i.e. the approach assumes that non-entrained individuals do not benefit from reduced competition resulting from lower densities. The consequence of not including density-dependent compensation in the model is an overestimation of entrainment impacts (Barnthouse 2002). Moreover, rather than being permanently removed from the ecosystem, fish entrained from once through cooling are usually returned to the source water body where they can support future primary and secondary production. Methods for estimating the magnitude of the biases resulting from neglect of these compensatory processes are not currently available (EPRI 2003).

Lifestage specific mortality rates were obtained from EPA (2004) values used to evaluate impingement and entrainment in the Mid-Atlantic Region (http://www.epa.gov/waterscience/316b/casestudy/final/appd1.pdf) or the North-Atlantic Region (http://www.epa.gov/waterscience/316b/casestudy/final/appc1.pdf) if mortality rates for a species were not available for the Mid-Atlantic. The entrainment estimates for fish eggs and larvae in Table 4 were expressed in terms of Age 1 equivalents using the survival rates in Table 5. The resulting Age 1 equivalents (Table 6) for selected species (> 99% of total entrainment) range from about 127,000 in the deep sampling strata with no diel correction applied to about 290,000 in the intermediate depth strata with diel correction factors applied. Searobin, cunner, and fourbeard rockling account for the majority (about 80%) of the estimated number of Age-1 equivalent fish lost to entrainment of eggs and larvae based on the combined Poletti (March-July, 2002) and site specific (August-October, 2005) data.

Table 5. **Lifestage specific mortality rates for selected species used in the Age-1 equivalent analysis obtained from EPA (2004). Instantaneous Total Mortality (Z) is the sum of Natural Morality (M) and Fishing Mortality (F), (Z = M+F). In this case, Z=M because none of the selected species are exposed to fishing mortality prior to Age 1. Survival rate (S) is the estimated proportion of a lifestage that survives from the beginning to the end of that stage ($S= e^{*}$). An adjusted survival rate (S*) was applied because S will differ within a lifestage depending on whether the fish is at the beginning or near the end of the stage, this adjustment is applied only to the stage at which entrainment occurs.**

Species	Lifestage	M[a]	S	S*
American Sand lance	Eggs	1.41	0.24	0.39
	Larvae	2.97	0.05	0.10
	Juvenile (YOY)	2.90	0.06	

[a] From Table C1-3 in EPA (2004)

Atlantic Mackerel	Eggs	2.39	0.09	0.17
	Larvae	5.30	0.005	0.01
	Juvenile (YOY)	5.30	0.005	

[a] From Table C1-7 in EPA (2004)

Atlantic Menhaden	Eggs	2.07	0.13	0.22
	Larvae	5.71	0.003	0.01
	Juvenile (YOY)	2.85	0.06	

[a] From Table D1-7 in EPA (2004)

Bay Anchovy	Eggs	1.04	0.35	0.52
	Larvae	7.70	0.0005	0.0009
	Juvenile (YOY)	1.29	0.28	

[a] From Table D1-10 in EPA (2004)

Butterfish	Eggs	2.30	0.10	0.18
	Larvae	6.64	0.001	0.003
	Juvenile (YOY)	0.92	0.40	

[a] From Table C1-14 in EPA (2004)

Cunner	Eggs	3.49	0.03	0.06
	Larvae	2.90	0.06	0.10
	Juvenile (YOY)	2.90	0.06	

[a] From Table C1-16 in EPA (2004)

Fourbeard Rockling	Eggs	2.30	0.10	0.18
	Larvae	4.25	0.01	0.03
	Juvenile (YOY)	0.92	0.40	

[a] From Table C1-17 in EPA (2004)

Fourspot and Smallmouth Flounder	Eggs	1.41	0.24	0.39
	Larvae	6.99	0.001	0.002
	Juvenile (YOY)	2.98	0.05	

[a] From Table C1-39 in EPA (2004)

$S^* = 2S_i e^{-\ln(1+S_i)}$ as described in text.

Table 5. (Continued)

Species	Lifestage	M[a]	S	S*
Grubby	Eggs	2.30	0.10	0.18
	Larvae	3.79	0.02	0.04
	Juvenile (YOY)	0.92	0.40	

[a] From Table C1-18 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Rock gunnel	Eggs	2.30	0.10	0.18
	Larvae	1.66	0.19	0.32
	Juvenile (YOY)	0.92	0.40	

[a] From Table C1-26 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Scup	Eggs	1.43	0.24	0.39
	Larvae	4.55	0.01	0.02
	Juvenile (YOY)	3.36	0.03	

[a] From Table C1-28 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Searobin	Eggs	2.30	0.10	0.18
	Larvae	3.66	0.03	0.05
	Juvenile (YOY)	0.92	0.40	

[a] From Table C1-30 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Tautog	Eggs	1.40	0.25	0.40
	Larvae	5.86	0.003	0.01
	Juvenile (YOY)	5.02	0.01	

[a] From Table C1-35 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Weakfish	Eggs	1.04	0.35	0.52
	Larvae	7.70	0.0005	0.0009
	Juvenile (YOY)	3.92	0.02	

[a] From Table D1-24 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Windowpane	Eggs	1.41	0.24	0.39
	Larvae	6.99	0.001	0.002
	Juvenile (YOY)	2.98	0.05	

[a] From Table D1-28 in EPA (2004)

Species	Lifestage	M[a]	S	S*
Winter Flounder	Eggs	0.29	0.75	0.86
	Larvae	4.37	0.01	0.02
	Juvenile (YOY)	2.38	0.09	

[a] From Table D1-29 in EPA (2004)

Table 6. **Age-1 equivalents of selected species entrained in the proposed FSRU facility derived from combination of the 2002 Poletti Ichthyoplankton (March 4-August 5) and the site specific data collected in August and October, 2005. The resulting estimates represent the March-October period sampled by the two datasets.**

	Intermediate Strata			Deep Strata		
	Entrainment Scenario			Entrainment Scenario		
Species	1	2	3	1	2	3
American sandlance	2,972	2,972	2,972	2,101	2,101	2,101
Atlantic mackerel	13	13	22	13	13	22
Atlantic menhaden	13,264	13,264	13,264	5,448	5,448	5,448
Bay anchovy	6,612	16,759	16,759	6,343	14,169	14,169
Butterfish	5,234	5,234	5,359	1,191	1,191	1,316
Cunner	63,604	63,604	63,849	16,556	16,556	16,801
Fourbeard rockling	91,494	91,494	91,494	39,854	39,854	39,854
Fourspot flounder	101	175	175	62	87	87
Grubby	975	975	975	758	758	758
Rock gunnel	38	38	38	287	287	287
Scup	16,604	16,604	16,604	1,886	1,886	1,886
Searobin	76,563	76,563	72,997	48,806	48,806	45,240
Smallmouth flounder	238	238	288	238	238	288
Tautog	487	487	487	191	191	191
Weakfish	16	16	16	25	25	24
Windowpane	179	179	177	110	110	108
Winter flounder	2,232	2,232	2,232	3,254	3,254	3,254
SUM	**280,623**	**290,844**	**287,706**	**127,122**	**134,973**	**131,835**

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Part 3

Modified Figures for the Onshore Facilities Resource Reports

The attached figures illustrate a modification to the Project area for Broadwater Energy's proposed Greenport onshore facilities. The modification accommodates the inclusion of additional industrial waterfront parcels to the north of the original Project area that were inadvertently omitted in the January 2006, filing.

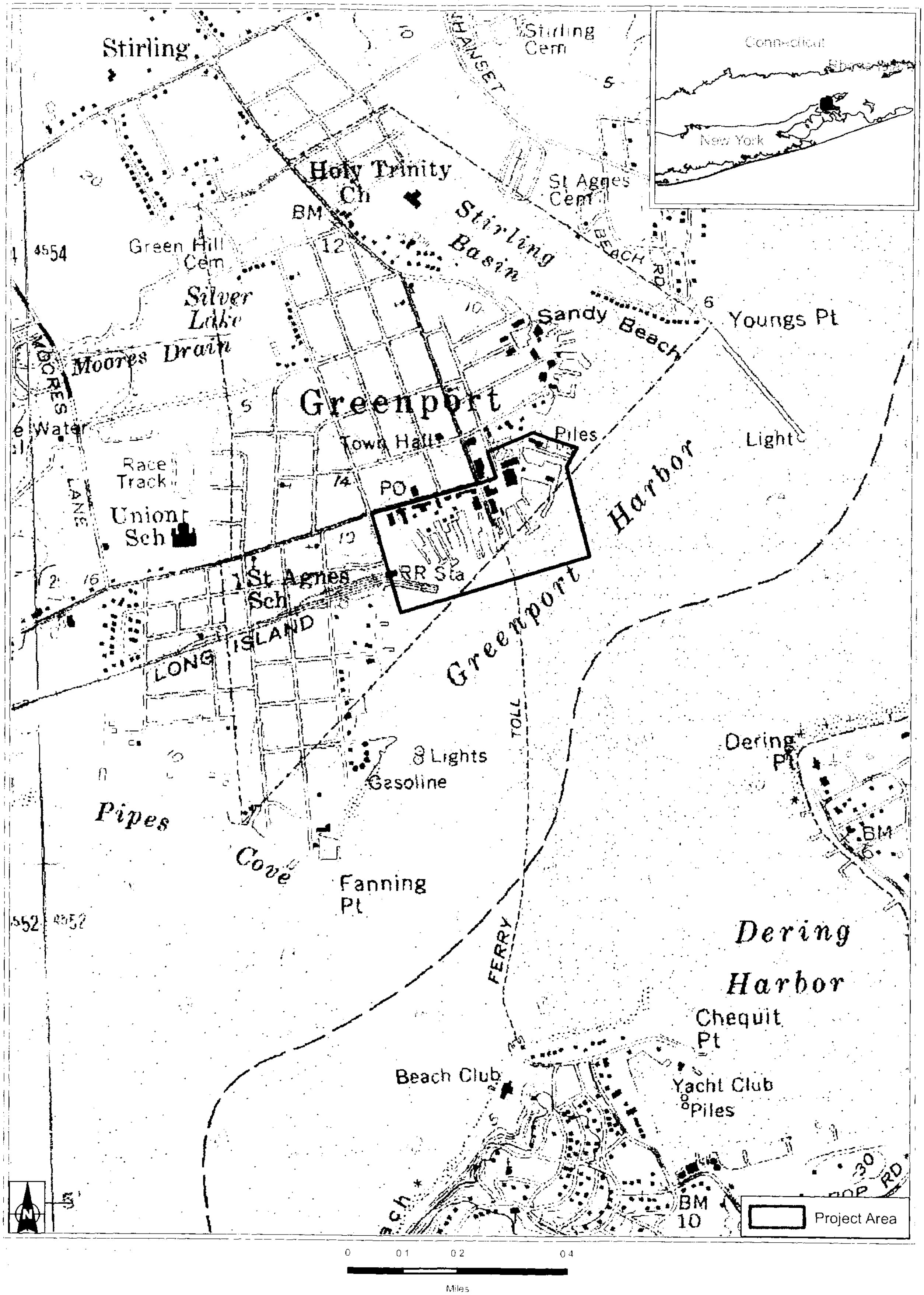

Figure 1-1 Proposed Onshore Facility Location
Greenport, New York

Figure 3-1 NYSDEC Freshwater Wetlands
Greenport, New York

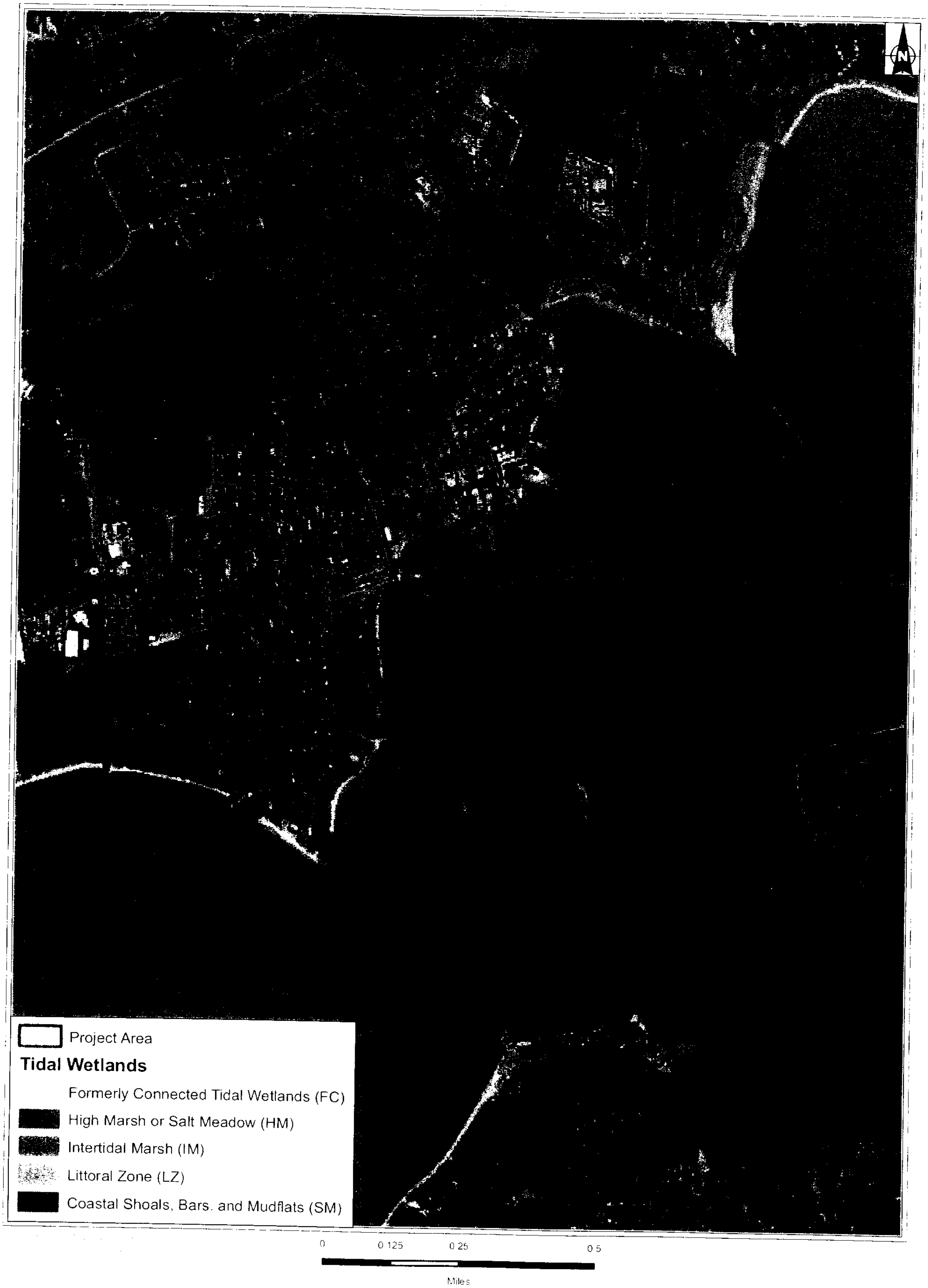

Figure 3-2 NYSDEC Tidal Wetlands Greenport, New York

Figure 3-3 **NWI Wetlands**
Greenport, New York

Species	Block Number 41007220
Atlantic salmon *(Salmo salar)*	JA
Atlantic cod *(Gadus morhua)*	
haddock *(Melanogrammus aeglefinus)*	
pollock *(Pollachius virens)*	JA
whiting *(Merluccius bilinearis)*	
offshore hake *(Merluccius albidus)*	
red hake *(Urophycis chuss)*	ELJA
white hake *(Urophycis tenuis)*	
witch flounder *(Glyptocephalus cynoglossus)*	
winter flounder *(Pleuronectes americanus)*	ELJA
yellowtail flounder *(Pleuronectes ferruginea)*	
windowpane flounder *(Scopthalmus aquosus)*	ELJA
American plaice *(Hippoglossoides platessoides)*	
ocean pout *(Macrozoarces americanus)*	
Atlantic sea scallop *(Placopecten magellanicus)*	
Atlantic sea herring *(Clupea harengus)*	EL
monkfish *(Lophius americanus)*	
bluefish *(Pomatomus saltatrix)*	EL
long finned squid *(Loligo pealei)*	
short finned squid *(Illex illecebrosus)*	
Atlantic butterfish *(Peprilus triacanthus)*	
Atlantic mackerel *(Scomber scombrus)*	ELJA
summer flounder *(Paralicthys dentatus)*	JA
scup *(Stenotomus chrysops)*	ELJ
black sea bass *(Centropristus striata)*	J
surf clam *(Spisula solidissima)*	
ocean quahog *(Artica islandica)*	
spiny dogfish *(Squalus acanthias)*	
tilefish *(Lopholatilus chamaeleonticeps)*	
king mackerel *(Scomberomorus cavalla)*	ELJA
Spanish mackerel *(Scomberomorus maculatus)*	ELJA
cobia *(Rachycentron canadum)*	ELJA
sand tiger shark *(Odontaspis taurus)*	L

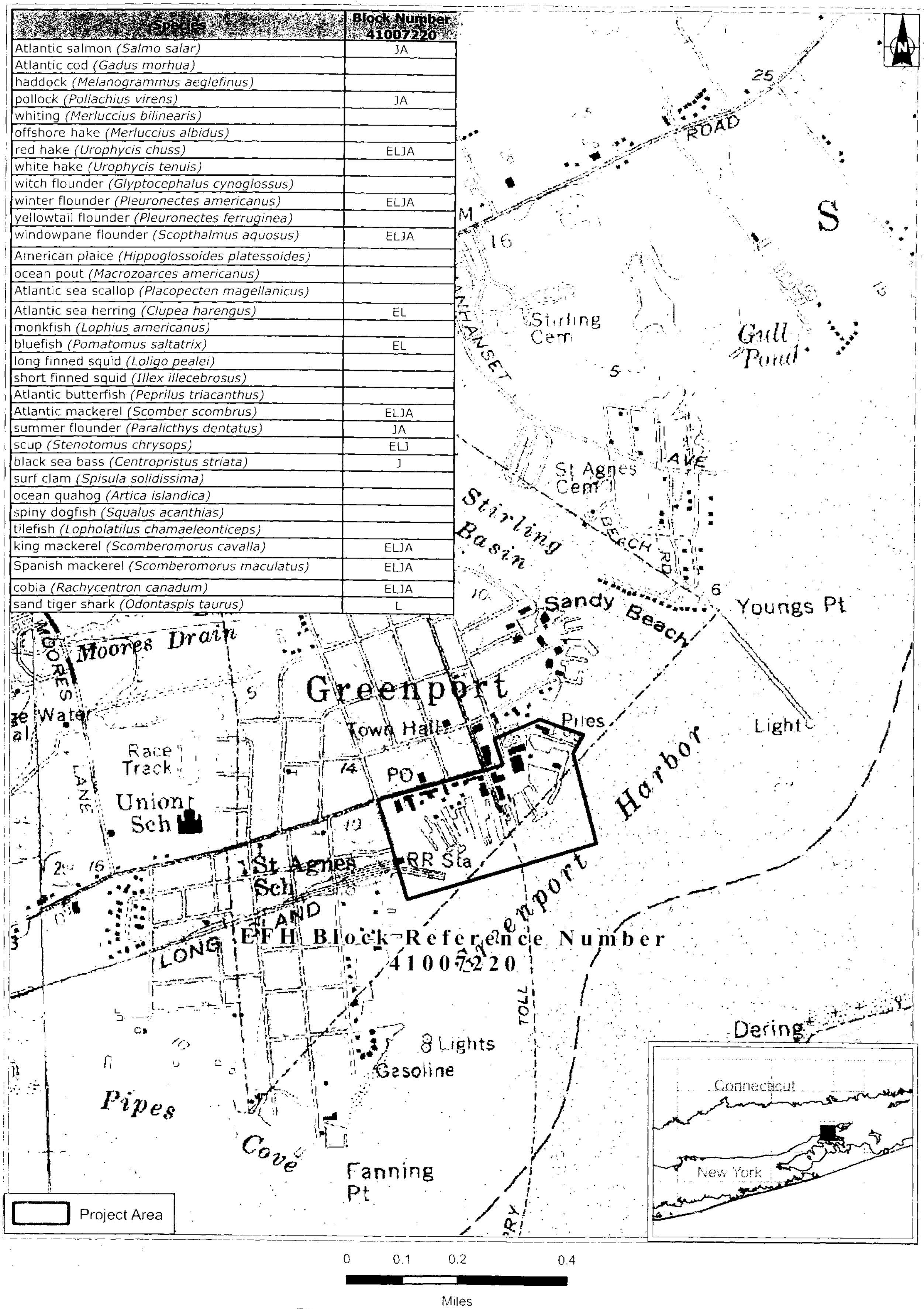

Figure 3-4 **Essential Fish Habitats**
Greenport, New York

Figure 3-5 **Significant Habitat Greenport, New York**

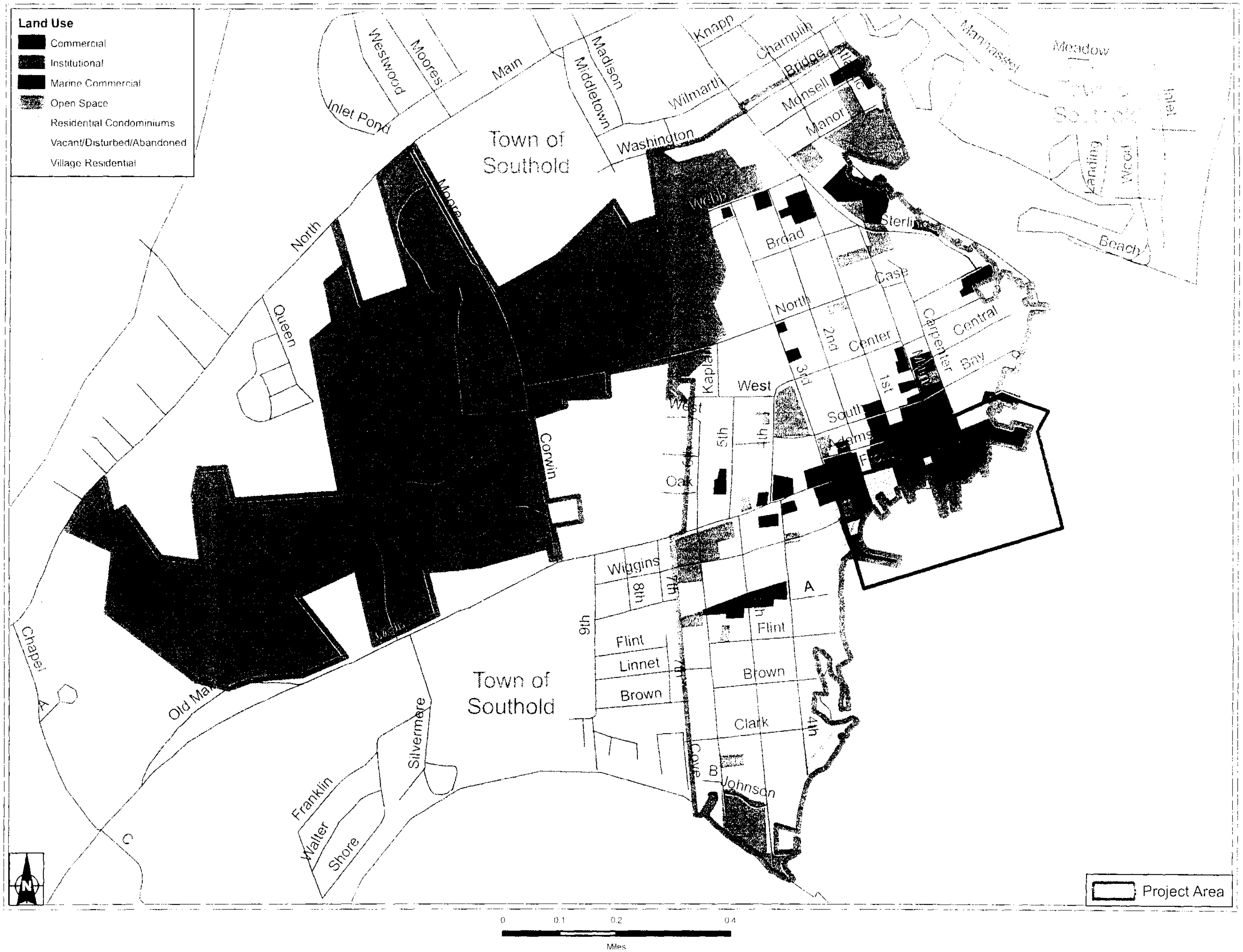

Figure 8-1 Greenport Land Use

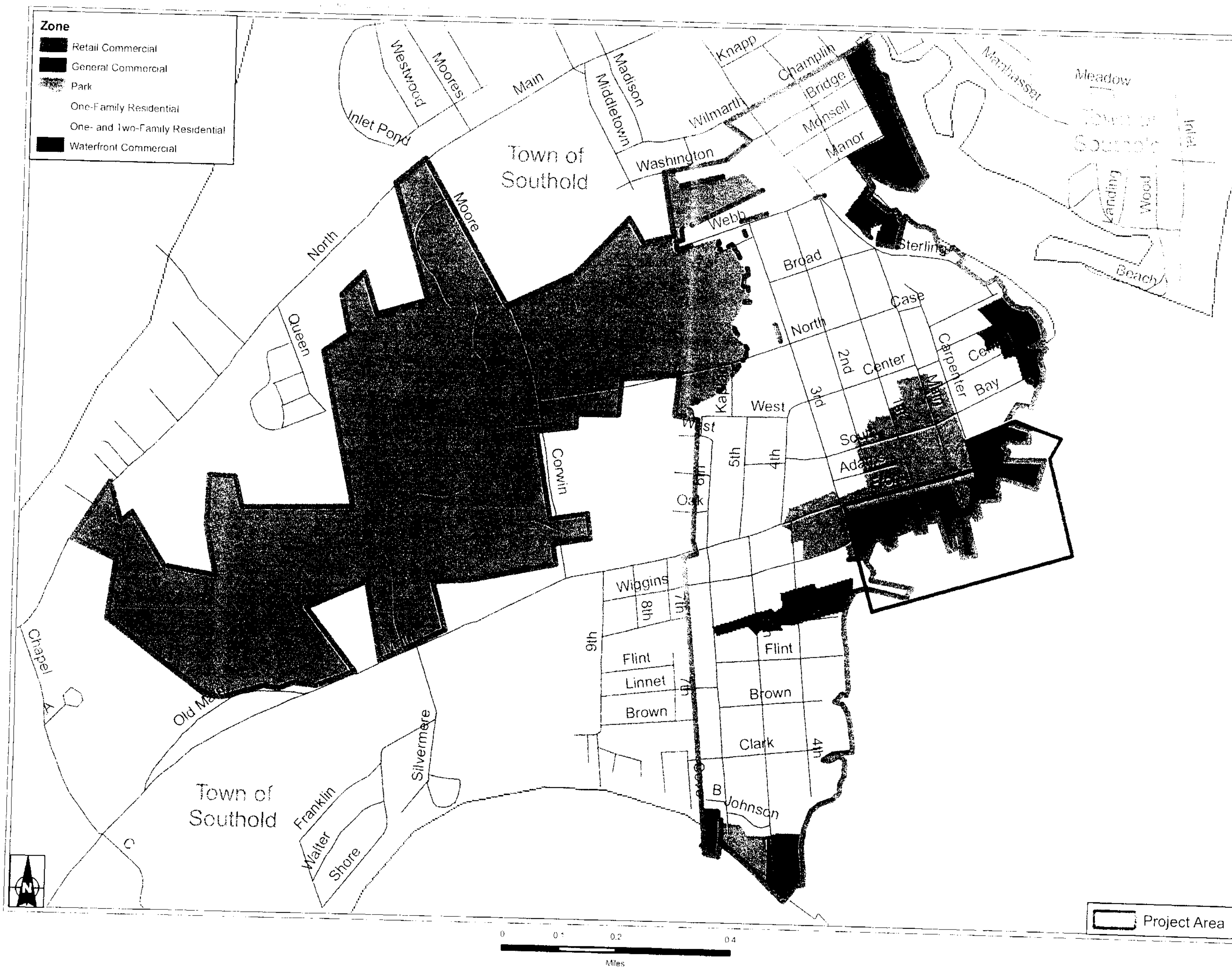

Figure 8-3 Greenport Zoning