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July 7, 2006

Christine Goodwin  
Friends of Holmes Harbor  
Post Office Box 493  
Freeland, Washington 98249

Dear Ms. Goodwin:

The Washington State Department of Health, Office of Food Safety and Shellfish is approving additional portions of Holmes Harbor for commercial shellfish harvesting. The northern portion of the current Unclassified area will be classified as Approved, while the southern-most portion of this area will be classified as Prohibited. A portion of the Harbor will remain Unclassified. We anticipate that the reclassification will be finalized by August 11, 2006. This classification is the result of a comprehensive review of shoreline sanitary conditions and marine water quality data.

The areas being classified are identified by boundary lines in Figure #3 of the enclosed Sanitary Survey report.

If you have any questions, please contact Debby Sargeant at (360) 236-3320.

Sincerely,

Nancy Napolilli  
Office Director

Enclosure





# SANITARY SURVEY OF HOLMES HARBOR

May 2006



**WASHINGTON STATE DEPARTMENT OF HEALTH**

OFFICE OF FOOD SAFETY AND SHELLFISH

Prepared by:

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## **I. Executive Summary**

The Holmes Harbor shellfish area is a large embayment located on the southeast shore of Whidbey Island (see Figure #1, page 10). Shellfish harvested commercially from the area include oysters, hard-shell clams, and mussels. Approximately 1,121 acres of shellfish grounds within Holmes Harbor are classified as Approved for commercial harvest (see Figure #2, page, 11). All commercial shellfish grounds within Holmes Harbor meet the National Shellfish Sanitation Program standards for the Approved classification.

The Department of Health Office of Food Safety and Shellfish Programs (DOH) recently completed a shoreline survey of Holmes Harbor. No direct or indirect impacts to the Approved portions of the area were identified during the survey. The survey did find elevated bacteria levels in samples collected from four surface water drainages located in the Unclassified portions of the area. Two of these drainages impact the public beach at Freeland Park, a popular recreational shellfish harvest area. Based on these results approximately 98 acres in the south end of Holmes harbor, including all of the Freeland Park tidelands, have been closed to shellfish harvest (see Figure 3, page 12). This action constitutes a downgrade in classification. The Freeland Park tidelands had previously been classified as Open to recreational shellfish harvest. The area is now classified as Closed. The area will also be classified as Prohibited for commercial shellfish harvest.

The shoreline survey also identified a shipyard that is located in close proximity to the marine shoreline at the south end of the harbor as a possible source of contamination. Based on the survey information regarding the shipyard, it is recommended that the portion of Holmes Harbor located between the Prohibited area and the Approved area (shown in Figure 3 on page 12) remain Unclassified until an assessment of the shipyard impacts can be completed.

## **II. Description of Growing Area**

### **A. Location map or chart showing growing area**

See Figure 1, page 10 and Figure 2, page 11

### **B. Description of area**

Holmes Harbor is a large embayment located on the southeastern shoreline of Whidbey Island. The harbor is approximately six miles long and two miles wide at its mouth and opens to the north into Saratoga Passage. Holmes Harbor, as defined by DOH, occupies a total area of approximately 5,960 acres. Approximately 1,121 acres within the area are classified as Approved and the remainder of the Harbor is listed as Unclassified for commercial harvest.

The Approved portion of Holmes Harbor consists of two separate areas (see figure 2, page 11). One area is located along approximately three and a half miles of the western shoreline and occupies an area of approximately 1,024 acres. A second area of approximately 97 acres surrounds Baby Island which is located

approximately 1000 feet off of the northeastern shoreline at the mouth of the Harbor.

Pacific oysters, hard-shell clams, and mussels have been harvested commercially from the Holmes Harbor shellfish area. Shellfish are also harvested recreationally from private tidelands and from the Freeland Park public tidelands located at the extreme south end of the harbor.

The majority of the Holmes Harbor shoreline and uplands has rural residential use. The town of Freeland is located at the extreme south end of the harbor. The shoreline and uplands in this portion of the harbor have been developed for commercial and industrial use. All of the homes and businesses in the area use on-site systems for the treatment and disposal of sewage.

C. History of growing area classification

Holmes Harbor has been classified and monitored as a shellfish growing area since 1987. The area has been classified as Approved since the original classification.

1. Date of last survey

The previous sanitary survey was written in 2001.

2. Previous classification(s) map(s)

Holmes Harbor has maintained an "Approved" classification since it was first classified in 1987

### III. Pollution Source Survey

A. Summary of Sources and Location

DOH staff completed a shoreline survey of the Holmes Harbor shellfish area in February 2006. A copy of the report is in the Holmes Harbor growing area file.

1. Map or chart showing the location of major sources of actual or potential pollution

Figure 2 on page 9 of the shoreline survey report shows the boundaries of the shoreline survey and the locations of drainage points and agricultural sites.

2. Table of sources of pollution cross-referenced to the map

The description and location of each drainage and agricultural site are in Appendix A, beginning on page 16 of the report.

B. Identification and evaluation of pollution sources

DOH staff completed a shoreline survey of the Holmes Harbor shellfish area in February 2006. The survey evaluated 165 developed parcels and five agricultural sites. The survey also identified 16 drainage/discharge points. No direct or indirect impacts to the Approved shellfish areas were identified. Detailed information can be found in the shoreline survey report, a copy of which is located in the Holmes Harbor growing area file.

2. Stormwater

The shoreline survey identified 16 drainages and discharge points within the Holmes Harbor area. Water samples were collected from 6 of these sites. Four samples were collected from each of the six sites over a three month period. While all six of the sites sampled showed elevated bacteria levels, insufficient data exists from the DOH sampling events to determine the relationship between stormwater discharge and marine water quality. Water sample results are shown in Table 2 on page 6 of the report and rainfall records are shown in Table 4 on page 8.

An independent study conducted by a private consulting firm examined water quality in an open ditch drainage system in the Freeland area. This system discharges to the beach at the south end of the bay. Sampling conducted during this study showed nearly consistent high levels of bacteria. It is likely that stormwater would have a significant influence on the levels of bacteria discharged to marine waters from this drainage system. Water sample results from this study are shown in Table 1 on page 5 of the report.

3. Agricultural waste (farms, feedlots, & slaughterhouse operations)

Five agricultural sites were identified during the survey. Two sites 060 and 070 may have the potential to impact the area during heavy rainfall. Three other sites were determined to have no impact. None of the sites are located in the Approved portions of the area. Site locations are shown in Figure 2 on page 9 of the report.

4. Wildlife areas

Harbor Seals occasionally use the shoreline of Baby Island. Marine water samples collected at the site do not indicate that the seals are a significant source of contamination.

5. Industrial wastes

One industrial site, Nichols Brothers Boat Builders Incorporated, is located in Freeland in close proximity to the marine shoreline. A detailed discussion of the potential impacts of this business is provided in the shoreline survey report. The possibility exists that contaminants from the shipyard have been and continue to be discharged to Holmes Harbor. The

Department of Health Office of Environmental Health Assessments will be conducting a literature review on this site that could lead to a risk assessment study.

#### IV. Hydrographic and Meteorological Characteristics

##### A. Tides

###### 1. Type

Holmes Harbor is subject to mixed tides, predominantly semi-diurnal, characterized by a large inequality in the high water heights, low water heights, or both. There are usually two high and two low tides each day but occasionally the tidal pattern will result in only one high or one low tide in a single day

###### 2. Amplitude

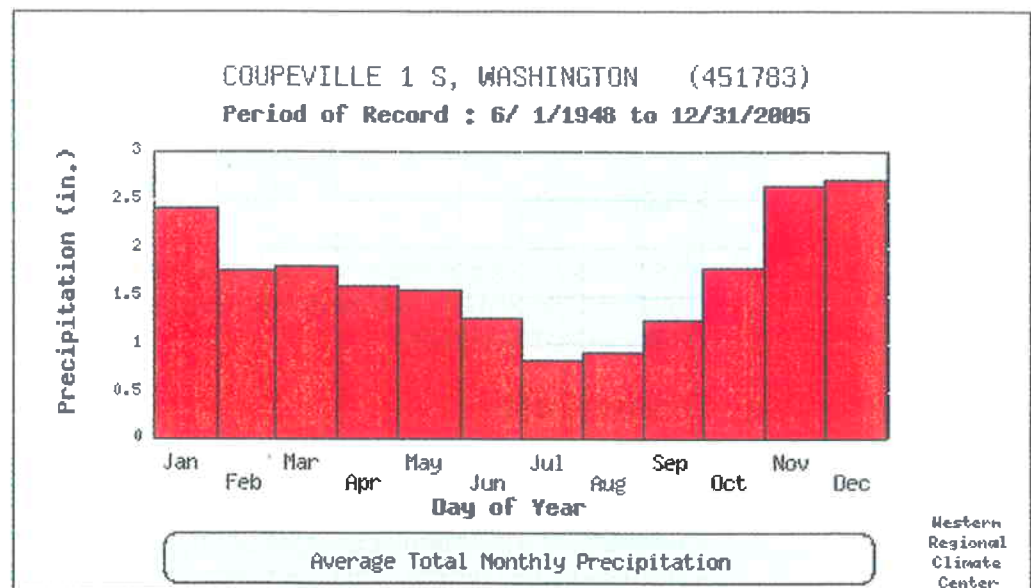
Tidal height in Holmes Harbor ranges from an extreme high of approximately +15 feet (15 feet above mean lower low water: MLLW), to an extreme low of approximately -3.5 feet (3.5 feet below MLLW).

##### B. Rainfall

###### 1. Amount

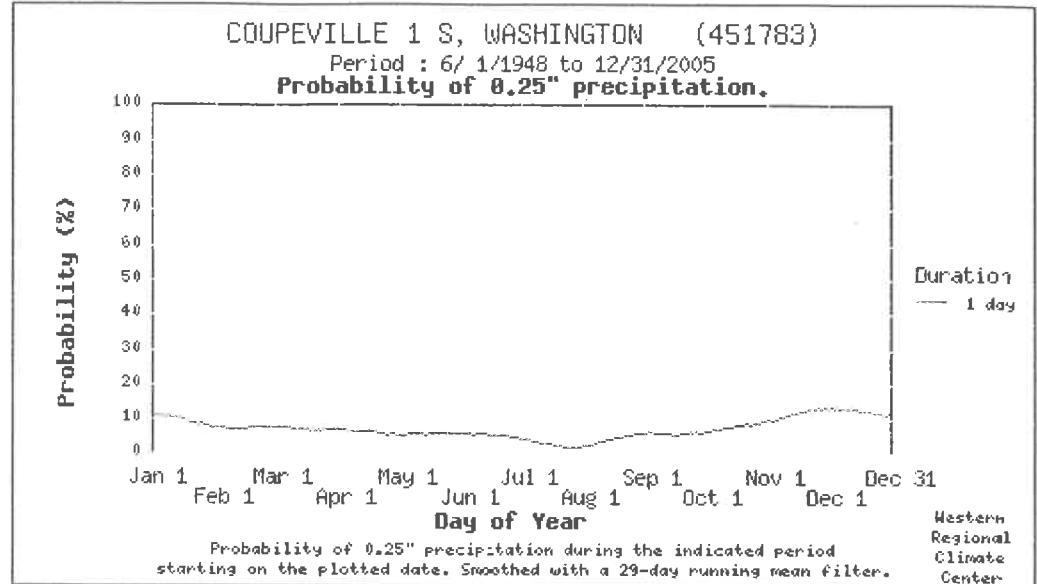
Average annual rainfall in the Holmes Harbor area using Coupeville rainfall records for the period 6/1/48 to 12/31/05 is 20.65 inches.

###### 2. When





3. Identify frequency of significant rainfalls



C. Winds - Seasonality and effects on pollution dispersion

The prevailing wind in the Holmes Harbor area is from the southwest. Strong northerly winds occasionally strike the area during the winter months. In an enclosed embayment like Holmes Harbor, wind can have a significant effect on the movement of the less saline layer of surface water in a marine system. In Holmes Harbor northerly winds would tend to concentrate and hold surface waters in the south end of the bay while southerly winds would tend to move surface water out of the bay.

D. River discharges

There are no significant freshwater streams that discharge directly into Holmes Harbor.

1. Volumes

NA

2. Seasonal

NA

E. Summary discussion concerning actual or potential effects of transport on pollution to the harvest area

Near Freeland, four surface water drainages discharge elevated fecal coliform bacteria levels. These freshwater drainages experience limited mixing with marine water in the intertidal zone. Once in the marine system the fecal

pollutants are increasingly diluted with clean marine water by the prevailing southerly winds and tides. Winds from the north will mix hold more of the pollution near the southern shoreline. The impact of these drainages is limited to the southernmost part of Holmes Harbor.

## **V. Water Quality Studies**

### **A. Map of sampling stations**

See Figure 2, page 11

### **B. Sampling plan and justification**

All samples were collected under the systematic random sampling method. The sample schedule was spread throughout the year to allow seasonal variations to be examined. The schedule for each sampling event was developed several weeks in advance of the actual sampling run to eliminate the targeting of any particular meteorological condition. A variety of tidal conditions were sampled.

Water sample presented in this report were collected between November 2002 and February 2006.

Marine water samples were collected in accordance with Chapter IV of the National Shellfish Sanitation Program Model Ordinance. DOH uses the following procedures when collecting water samples from shellfish growing areas:

Samples are collected from approximately six inches below the surface using 100ml, sterile plastic bottles. Samples are immediately placed in an iced, insulated cooler, transported to the Washington State Public Health Laboratory in Seattle and processed within 30 hours. Surface water temperature, salinity, tidal phase, and sampling time are recorded at each sampling site. Water samples are processed using the American Public Health Association (APHA) a-1 Modified (5-tube/3 dilution) Method.

### **C. Sample Data Analysis and Presentation - Tables containing the basic NSSP statistics (number of samples, median or geometric mean, and the respective variability factors)**

#### **1. Station by station array - adverse condition or systematic random sampling**

See Table 1, page 9.

#### **2. Daily sampling results**

See Appendix A, page 13.

#### **3. Overall compliance with NSSP criteria**

All marine water sampling stations in Holmes Harbor meet the NSSP water quality criteria for the Approved classification.

4. Classification of station

All sampling stations in the Holmes Harbor shellfish area meet the NSSP water quality criteria for an Approved classification.

**VI. Interpretation of Data in Determining Area Classification - A discussion of how actual or potential pollution sources, wind, tide, rainfall, etc. affect or may affect water quality, that will address the following:**

A. Effects of meteorological and hydrographic conditions on bacterial loading

The bacterial loadings are low under in all areas of Holmes Harbor except the for the southernmost part near Freeland where four drainages have been found to discharge elevated levels of fecal coliform bacteria. Winds and tides have a limited effect on diluting and dispersing that pollution in the intertidal zone. However, dilution and dispersion is increased dramatically once the surface water becomes mixed due to tidal currents and winds. The growing area receives a relatively low amount of rainfall of about 20 inches per year. Heavy or persistent rain could bring greater levels of pollution into the southern portion of Holmes Harbor, but that has not been documented.

B. Variability in the data and causes

Water sample results indicate that there is little variability in water quality.

**VII. Conclusions**

A. Map or chart showing classification (closure lines, lines separating various classifications)

Figure 2; page 11 shows the locations of the current Approved area boundary lines. Figure 3; page 12 shows the locations of the new boundary lines separating the Approved, Unclassified, and Prohibited portions of Holmes Harbor.

B. Legal descriptions for the newly classified area:

The boundary line between the Prohibited and Unclassified portions of Holmes Harbor is described as beginning on the west shoreline at a point located at approximately Latitude  $48.01824^{\circ}$  N, Longitude  $122.54160^{\circ}$  W and extending across the Harbor to the east shoreline at a point located at approximately Latitude  $48.01979^{\circ}$  N, Longitude  $122.52161^{\circ}$  W.

The boundary line between the Unclassified and Approved portions of Holmes Harbor is described as beginning on the west shoreline at a point located at approximately Latitude  $48.03683^{\circ}$  N, Longitude  $122.53688^{\circ}$  W and extending

across the Harbor to the east shoreline at a point located at approximately Latitude 48.03694<sup>0</sup> N, Longitude 122.51081<sup>0</sup> W.

The northern boundary line of Holmes Harbor and of the Approved area is described as beginning on the west shoreline at a point located at approximately Latitude 48.10955<sup>0</sup> N, Longitude 122.56580<sup>0</sup> W and extending east across the mouth of the Harbor to a point located at approximately Latitude 48.10323<sup>0</sup> N, Longitude 122.52464<sup>0</sup> W then extending southeast to a point located at approximately Latitude 48.09976<sup>0</sup> N, Longitude 122.521<sup>0</sup> and then extending south to the shoreline to a point located at approximately Latitude 48.09695<sup>0</sup> N, Longitude 122.52204<sup>0</sup>.

The Approved area defined by these boundaries will encompass an area of approximately 5,068 acres. The Unclassified area will encompass an area of approximately 794 acres. The Prohibited area will encompass an area of approximately 98 acres.

C. Management plan (if conditionally approved or conditionally restricted)

None

D. Recommendations for Sanitary Survey improvement

1. Monitoring schedule, stations, etc.

The marine water sampling stations in the Approved portion of Holmes Harbor must be sampled a minimum of six times per year under the systematic random sampling strategy. The number and location of the sampling stations in the Approved area and the proposed Approved area are adequate. It is recommended that sampling of freshwater discharges and marine water in the Freeland area be done as frequently as required to determine their continued impact and the success of restoration efforts to reopen Freeland County Park to shellfish harvesting.

2. Comments

Current water quality and shoreline sanitary conditions indicate that classifications of Approved and Prohibited are appropriate for the Holmes Harbor shellfish area.

Based on the results of the 2006 DOH shoreline survey and current water quality data, it is recommended that the boundary line adjustments and shellfish area classifications shown in Figure 3, page 12 and described in section VII, B on pages 7 and 8, be implemented.

**TABLE 1****SUMMARY OF MARINE WATER DATA (SRS)**Growing Area: **HOLMES HARBOR**Classification: **Approved,Unclassified**

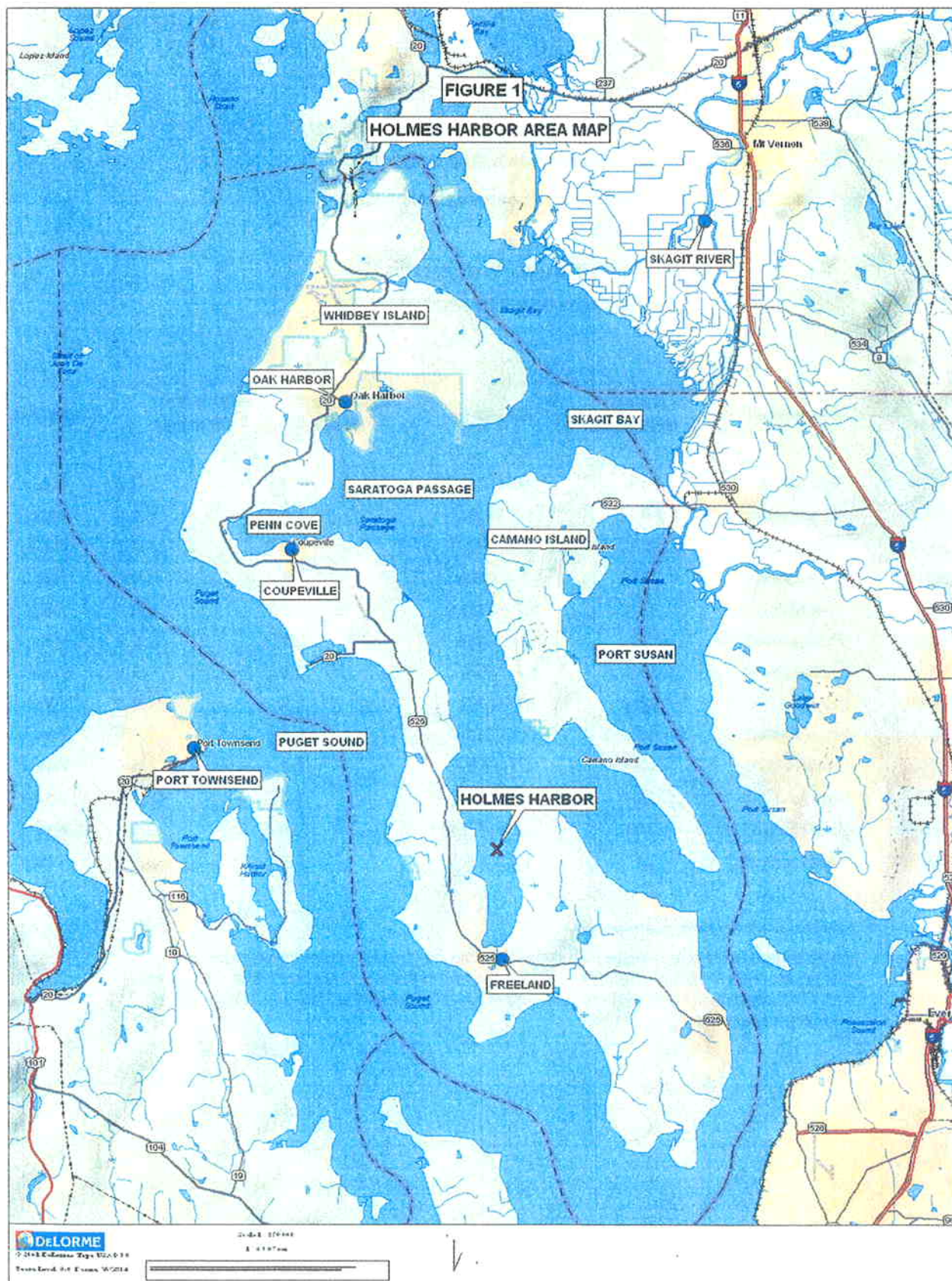
From 11/12/2002 To 02/27/2006

**FECAL COLIFORM ORGANISMS/100 ML**

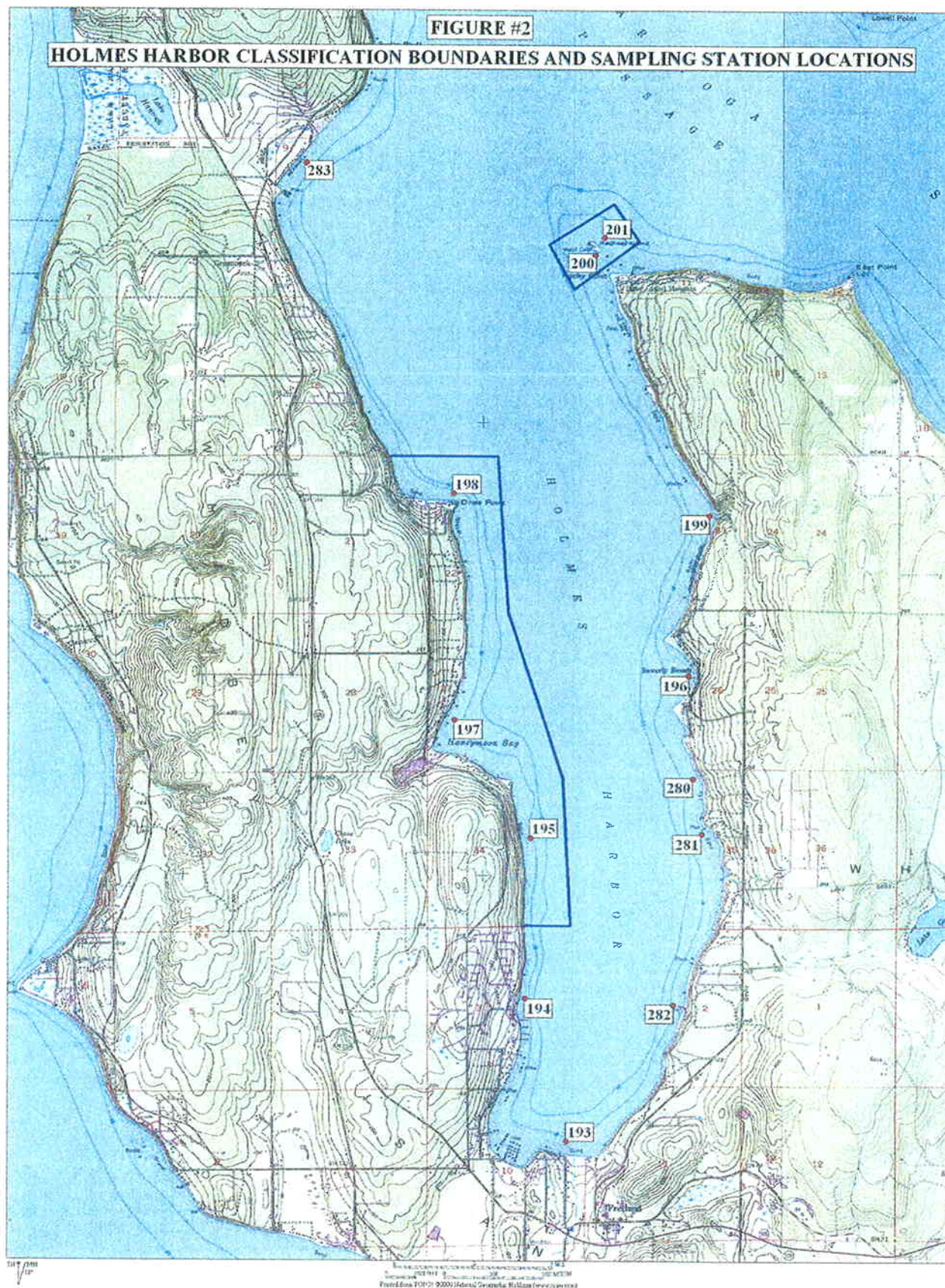
Station Number	Classification	Number of Samples	Range	Geometric Mean	Est. 90th Percentile	Meets Std.
195	Approved	32	1.7 - 13.0	2.0	3.0	Yes
197	Approved	32	1.7 - 4.5	1.9	2.0	Yes
198	Approved	32	1.7 - 6.8	1.8	2.0	Yes
200	Approved	32	1.7 - 130.0	2.4	8.0	Yes
201	Approved	32	1.7 - 49.0	2.8	9.0	Yes
193	Unclassified	32	1.7 - 130.0	2.2	6.0	Yes
194	Unclassified	32	1.7 - 79.0	2.6	9.0	Yes
196	Unclassified	30	1.7 - 13.0	2.1	4.0	Yes
199	Unclassified	32	1.7 - 2.0	1.7	1.0	Yes
280	Unclassified	33	1.7 - 2.0	1.7	1.0	Yes
281	Unclassified	33	1.7 - 4.5	1.8	2.0	Yes
282	Unclassified	33	1.7 - 11.0	2.0	3.0	Yes
283	Unclassified	33	1.7 - 7.8	1.8	2.0	Yes

All tides information is presented

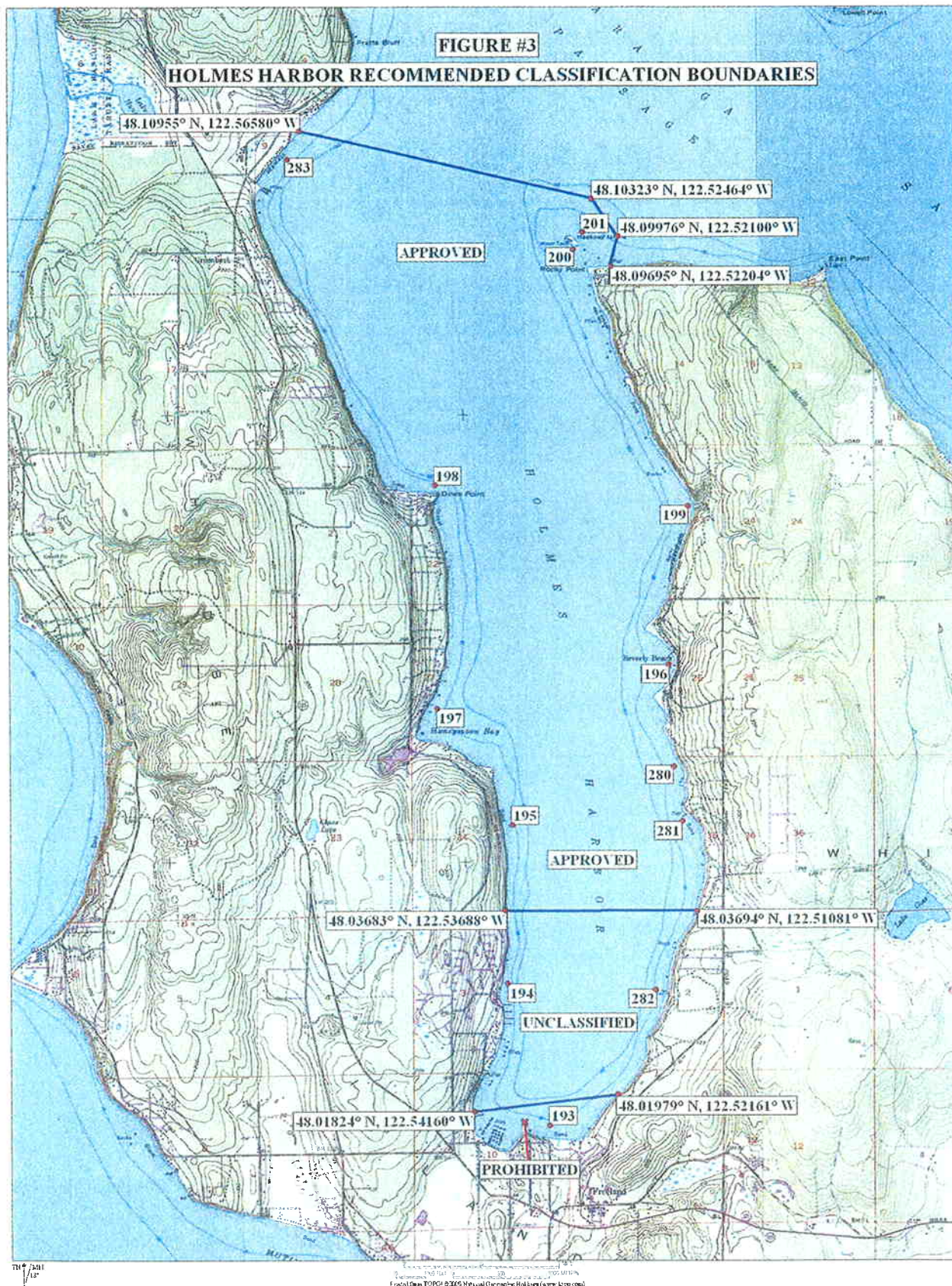
The standard for approved shellfish growing waters is fecal coliform geometric mean not greater than 14 organisms/100 ml and an estimate of the 90th percentile not greater than 43 organisms/100 ml. The above table shows bacteriological results in relation to program standards.













**APPENDIX A**

**DAILY MARINE WATER SAMPLE RESULTS**  
**SORTED BY SAMPLING STATION**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **193**

Classification: **Unclassified**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:53	Flood	2	11	30
01/06/2003	12:43	Ebb	1.7	7	28
02/24/2003	12:02	Ebb	1.7	7	24
05/27/2003	11:16	Flood	1.7	14	24
06/09/2003	12:40	Flood	1.7	14	25
07/08/2003	12:13	Flood	2	16	25
09/02/2003	12:25	Ebb	1.7	17	28
10/27/2003	11:01	Ebb	1.7	11	10
11/18/2003	13:14	Ebb	2	9	22
12/15/2003	10:48	Ebb	1.7	8	20
01/20/2004	13:09	Flood	1.7	7	16
02/17/2004	11:51	Flood	1.7	7	25
03/29/2004	11:51	Ebb	1.7	9	30
04/12/2004	12:41	Ebb	1.7	13	25
05/18/2004	12:31	Flood	1.7	16	25
06/07/2004	12:35	Ebb	1.7	14	25
07/26/2004	12:05	Flood	1.7	20	25
08/23/2004	11:02	Flood	17	17	30
09/27/2004	12:51	Flood	1.7	14	18
10/25/2004	12:49	Flood	2	11	28
11/01/2004	13:08	Ebb	1.7	10	28
11/30/2004	12:21	Ebb	2	7	20
01/04/2005	13:06	Ebb	1.7	4	22
03/21/2005	12:50	Flood	1.7	8	30
04/26/2005	12:09	Ebb	4	14	25
05/02/2005	12:37	Flood	1.7	13	24
07/11/2005	13:08	Ebb	1.7	14	30
08/16/2005	12:46	Flood	2	18	28
09/26/2005	13:08	Flood	1.7	14	30
10/03/2005	12:26	Flood	1.7	12	30
11/01/2005	13:37	Flood	130	11	30
02/27/2006	12:34	Flood	1.7	8	28

Number of Samples: 32

Geometric Mean: 2.2

Range: 1.7 - 130

Estimated 90th Percentile: 6

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **194**

Classification: **Unclassified**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:01	Flood	1.7	12	30
01/06/2003	12:48	Ebb	1.7	7	28
02/24/2003	12:06	Ebb	2	7	24
05/27/2003	11:20	Flood	1.7	15	25
06/09/2003	12:36	Flood	4.5	14	25
07/08/2003	12:18	Flood	1.7	17	25
09/02/2003	12:20	Ebb	1.7	16	28
10/27/2003	10:57	Ebb	1.7	11	10
11/18/2003	13:11	Ebb	11	9	22
12/15/2003	10:52	Ebb	1.7	8	20
01/20/2004	13:13	Flood	1.7	7	16
02/17/2004	11:56	Flood	2	7	25
03/29/2004	11:54	Ebb	1.7	9	26
04/12/2004	12:45	Ebb	2	13	25
05/18/2004	12:35	Flood	1.7	16	25
06/07/2004	12:37	Ebb	1.7	14	25
07/26/2004	12:08	Flood	1.7	20	24
08/23/2004	11:06	Flood	49	16	30
09/27/2004	12:55	Flood	1.7	14	18
10/25/2004	12:53	Flood	1.7	11	30
11/01/2004	10:58	Ebb	6.8	9	25
11/30/2004	12:26	Ebb	1.7	7	24
01/04/2005	13:01	Ebb	1.7	4	20
03/21/2005	12:45	Flood	2	8	30
04/26/2005	12:13	Ebb	1.7	14	25
05/02/2005	12:40	Flood	79	13	24
07/11/2005	13:13	Ebb	4	14	30
08/16/2005	12:50	Flood	2	18	28
09/26/2005	13:12	Flood	1.7	15	28
10/03/2005	12:40	Flood	7.8	12	30
11/01/2005	13:41	Flood	1.7	11	30
02/27/2006	12:38	Flood	1.7	8	28

**Number of Samples: 32**

**Geometric Mean: 2.6**

**Range: 1.7 - 79**

**Estimated 90th Percentile: 9**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **195**

Classification: **Approved**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:06	Flood	1.7	12	30
01/06/2003	12:53	Ebb	1.7	7	25
02/24/2003	12:09	Ebb	1.7	7	22
05/27/2003	11:24	Flood	1.7	14	25
06/09/2003	12:33	Flood	1.7	14	25
07/08/2003	12:22	Flood	1.7	17	25
09/02/2003	12:16	Ebb	1.7	15	28
10/27/2003	10:54	Ebb	1.7	11	9
11/18/2003	13:07	Ebb	1.7	9	22
12/15/2003	10:57	Ebb	1.7	8	20
01/20/2004	13:17	Flood	4	7	15
02/17/2004	12:00	Flood	1.7	7	25
03/29/2004	11:59	Ebb	1.7	10	26
04/12/2004	12:48	Ebb	1.7	13	25
05/18/2004	12:40	Flood	1.7	16	25
06/07/2004	12:40	Ebb	1.7	14	25
07/26/2004	12:13	Flood	1.7	20	25
08/23/2004	11:12	Flood	13	16	30
09/27/2004	13:01	Flood	1.7	14	18
10/25/2004	12:58	Flood	7.8	11	30
11/01/2004	11:04	Ebb	1.7	9	26
11/30/2004	12:30	Ebb	2	2	22
01/04/2005	12:55	Ebb	1.7	4	20
03/21/2005	12:40	Flood	1.7	8	30
04/26/2005	12:17	Ebb	1.7	14	25
05/02/2005	12:44	Flood	1.7	13	20
07/11/2005	13:17	Ebb	2.7	14	30
08/16/2005	12:54	Flood	2	18	28
09/26/2005	13:16	Flood	1.7	15	30
10/03/2005	12:44	Flood	1.7	12	30
11/01/2005	13:45	Flood	1.7	11	28
02/27/2006	12:43	Flood	1.7	8	30

Number of Samples: 32

Geometric Mean: 2.0

Range: 1.7 - 13

Estimated 90th Percentile: 3

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **196**

Classification: **Unclassified**

<b>Sample Date</b>	<b>Sample Time</b>	<b>Tide</b>	<b>Fcoli/100ml</b>	<b>Temperature</b>	<b>Salinity</b>
11/12/2002	11:36	Flood	2	11	30
01/06/2003	12:28	Ebb	1.7	7	26
02/24/2003	11:45	Ebb	1.7	7	25
05/27/2003	10:59	Flood	4.5	14	23
06/09/2003	12:51	Flood	1.7	15	24
07/08/2003	11:57	Flood	1.7	15	25
09/02/2003	12:42	Ebb	2	17	28
10/27/2003	11:11	Ebb	1.7	11	10
11/18/2003	13:28	Ebb	2	9	22
12/15/2003	11:52	Ebb	1.7	8	22
02/17/2004	11:36	Flood	1.7	7	25
03/29/2004	11:35	Ebb	1.7	10	26
04/12/2004	12:28	Ebb	1.7	12	25
05/18/2004	12:12	Flood	1.7	16	25
06/07/2004	12:19	Ebb	1.7	14	25
07/26/2004	11:49	Flood	1.7	19	25
08/23/2004	14:15	Ebb	2	17	30
09/27/2004	12:32	Flood	2	14	18
11/01/2004	12:53	Ebb	1.7	10	26
11/30/2004	12:04	Ebb	13	7	22
01/04/2005	13:22	Ebb	2	5	22
03/21/2005	13:12	Flood	1.7	9	28
04/26/2005	12:05	Ebb	1.7	14	25
05/02/2005	12:24	Flood	1.7	13	18
07/11/2005	12:51	Ebb	1.7	14	30
08/16/2005	12:29	Flood	1.7	17	28
09/26/2005	12:49	Flood	1.7	14	30
10/03/2005	12:08	Flood	13	12	30
11/01/2005	13:24	Flood	7.8	11	28
02/27/2006	12:17	Flood	1.7	7	25

**Number of Samples: 30**

**Geometric Mean: 2.1**

**Range: 1.7 - 13**

**Estimated 90th Percentile: 4**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **197**

Classification: **Approved**

<b>Sample Date</b>	<b>Sample Time</b>	<b>Tide</b>	<b>Fcoli/100ml</b>	<b>Temperature</b>	<b>Salinity</b>
11/12/2002	11:14	Flood	1.7	12	30
01/06/2003	12:57	Ebb	1.7	7	25
02/24/2003	12:13	Ebb	1.7	7	24
05/27/2003	11:28	Flood	1.7	14	24
06/09/2003	12:30	Flood	4	15	25
07/08/2003	12:27	Flood	1.7	17	25
09/02/2003	12:12	Ebb	1.7	15	28
10/27/2003	10:49	Ebb	1.7	11	10
11/18/2003	13:03	Ebb	4.5	9	22
12/15/2003	11:01	Ebb	2	8	20
01/20/2004	13:21	Flood	2	7	15
02/17/2004	12:04	Flood	1.7	7	25
03/29/2004	12:05	Ebb	1.7	10	28
04/12/2004	12:51	Ebb	2	13	25
05/18/2004	12:46	Flood	2	17	25
06/07/2004	12:44	Ebb	1.7	14	25
07/26/2004	12:17	Flood	1.7	20	25
08/23/2004	11:16	Flood	1.7	16	30
09/27/2004	13:06	Flood	2	14	18
10/25/2004	13:02	Flood	1.7	11	30
11/01/2004	11:10	Ebb	1.7	9	26
11/30/2004	12:34	Ebb	4.5	7	20
01/04/2005	12:51	Ebb	1.7	4	20
03/21/2005	12:35	Flood	1.7	8	30
04/26/2005	12:21	Ebb	1.7	14	25
05/02/2005	12:47	Flood	1.7	13	20
07/11/2005	13:21	Ebb	1.8	14	28
08/16/2005	12:58	Flood	1.7	18	28
09/26/2005	13:20	Flood	1.7	15	30
10/03/2005	12:49	Flood	1.7	12	30
11/01/2005	13:48	Flood	1.7	11	28
02/27/2006	12:47	Flood	1.7	8	26

**Number of Samples: 32**

**Geometric Mean: 1.9**

**Range: 1.7 - 4.5**

**Estimated 90th Percentile: 2**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **198**

Classification: **Approved**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:19	Flood	6.8	12	30
01/06/2003	13:03	Ebb	1.7	7	25
02/24/2003	12:18	Ebb	1.7	7	24
05/27/2003	11:34	Flood	2	14	25
06/09/2003	12:26	Flood	1.7	15	25
07/08/2003	12:31	Flood	1.7	16	25
09/02/2003	12:07	Ebb	1.7	15	28
10/27/2003	10:45	Ebb	1.7	11	10
11/18/2003	12:59	Ebb	1.7	9	22
12/15/2003	11:07	Ebb	2	8	20
01/20/2004	13:25	Flood	2	7	15
02/17/2004	12:09	Flood	1.7	7	25
03/29/2004	12:10	Ebb	1.7	10	28
04/12/2004	12:56	Ebb	1.7	13	25
05/18/2004	12:53	Flood	1.7	16	22
06/07/2004	12:49	Ebb	1.7	14	24
07/26/2004	12:21	Flood	1.7	20	25
08/23/2004	11:21	Flood	4.5	16	28
09/27/2004	13:11	Flood	1.7	14	18
10/25/2004	13:06	Flood	1.7	11	30
11/01/2004	11:17	Ebb	1.7	9	28
11/30/2004	12:38	Ebb	1.7	7	20
01/04/2005	12:47	Ebb	2	4	20
03/21/2005	12:29	Flood	1.7	8	28
04/26/2005	12:27	Ebb	1.7	14	25
05/02/2005	12:52	Flood	1.7	13	20
07/11/2005	13:26	Ebb	2	14	30
08/16/2005	13:02	Flood	1.7	18	28
09/26/2005	13:24	Flood	2	14	30
10/03/2005	12:53	Flood	2	12	30
11/01/2005	13:52	Flood	1.7	11	28
02/27/2006	12:51	Flood	1.7	8	25

**Number of Samples: 32**

**Geometric Mean: 1.8**

**Range: 1.7 - 6.8**

**Estimated 90th Percentile: 2**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **199**

Classification: **Unclassified**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:31	Flood	2	11	30
01/06/2003	12:23	Ebb	1.7	7	25
02/24/2003	11:38	Ebb	1.7	7	25
05/27/2003	10:55	Flood	1.7	13	23
06/09/2003	12:54	Flood	1.7	15	24
07/08/2003	11:52	Flood	1.7	15	28
09/02/2003	12:46	Ebb	1.7	16	28
10/27/2003	11:14	Ebb	2	11	10
11/18/2003	13:23	Ebb	1.7	9	20
12/15/2003	11:46	Ebb	1.7	8	22
01/20/2004	12:54	Flood	1.7	7	18
02/17/2004	11:30	Flood	2	7	25
03/29/2004	11:29	Ebb	1.7	10	22
04/12/2004	12:24	Ebb	1.7	12	24
05/18/2004	12:09	Flood	1.7	15	25
06/07/2004	12:15	Ebb	2	14	24
07/26/2004	11:44	Flood	1.7	19	25
08/23/2004	14:10	Ebb	1.7	17	28
09/27/2004	12:28	Flood	1.7	14	18
10/25/2004	12:31	Flood	1.7	11	30
11/01/2004	12:49	Ebb	1.7	10	26
11/30/2004	11:59	Ebb	1.7	7	20
01/04/2005	13:26	Ebb	1.7	5	22
03/21/2005	13:16	Flood	1.7	9	29
04/26/2005	11:46	Ebb	1.7	12	25
05/02/2005	12:20	Flood	1.7	13	24
07/11/2005	12:45	Ebb	1.7	14	30
08/16/2005	12:25	Flood	1.7	17	28
09/26/2005	12:45	Flood	1.7	14	30
10/03/2005	12:04	Flood	1.7	12	30
11/01/2005	13:21	Flood	1.7	11	28
02/27/2006	12:12	Flood	1.8	7	22

Number of Samples: 32

Geometric Mean: 1.7

Range: 1.7 - 2

Estimated 90th Percentile: 1



**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **200**

Classification: **Approved**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
12/16/2002	13:03	Flood	2	10	30
01/06/2003	12:20	Ebb	1.8	7	28
02/24/2003	11:34	Ebb	1.7	7	24
05/27/2003	10:49	Flood	1.7	13	25
06/09/2003	12:57	Flood	1.7	15	25
07/08/2003	11:48	Flood	1.7	14	26
09/02/2003	12:50	Ebb	1.7	16	28
10/27/2003	11:17	Ebb	2	11	9
11/18/2003	13:37	Ebb	2	9	24
12/15/2003	11:31	Ebb	2	8	20
01/20/2004	12:45	Flood	1.7	7	15
02/17/2004	11:24	Flood	1.7	7	25
03/29/2004	11:24	Ebb	1.7	10	28
04/12/2004	12:19	Ebb	1.7	12	25
05/18/2004	12:02	Flood	1.7	15	24
06/07/2004	12:10	Ebb	1.7	14	25
07/26/2004	11:39	Flood	1.7	18	25
08/23/2004	14:04	Ebb	1.7	17	30
09/27/2004	12:23	Flood	1.7	13	18
10/25/2004	12:25	Flood	17	11	30
11/01/2004	12:40	Ebb	1.7	10	28
11/30/2004	11:53	Ebb	4.5	8	20
01/04/2005	13:32	Ebb	1.7	5	20
03/21/2005	13:19	Flood	1.7	9	30
04/26/2005	11:39	Ebb	1.7	12	25
05/02/2005	12:15	Flood	46	13	20
07/11/2005	12:36	Ebb	1.7	14	30
08/16/2005	12:18	Flood	1.7	16	28
09/26/2005	12:41	Flood	2	14	30
10/03/2005	11:51	Ebb	130	12	32
11/01/2005	13:16	Flood	1.7	11	28
02/27/2006	12:06	Flood	2	7	24

**Number of Samples: 32**

**Geometric Mean: 2.4**

**Range: 1.7 - 130**

**Estimated 90th Percentile: 8**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **201**

Classification: **Approved**

<b>Sample Date</b>	<b>Sample Time</b>	<b>Tide</b>	<b>Fcoli/100ml</b>	<b>Temperature</b>	<b>Salinity</b>
12/16/2002	13:07	Flood	1.7	10	30
01/06/2003	12:18	Ebb	1.7	7	25
02/24/2003	11:30	Ebb	1.7	7	25
05/27/2003	10:45	Flood	2	13	16
06/09/2003	13:00	Flood	1.7	15	24
07/08/2003	11:45	Flood	1.7	15	25
09/02/2003	12:53	Ebb	23	16	28
10/27/2003	11:22	Ebb	1.7	11	9
11/18/2003	13:40	Ebb	1.7	9	22
12/15/2003	11:28	Ebb	4.5	8	20
01/20/2004	12:48	Flood	2	7	15
02/17/2004	11:20	Flood	1.7	7	28
03/29/2004	11:20	Ebb	1.7	10	28
04/12/2004	12:17	Ebb	6.8	12	25
05/18/2004	11:55	Flood	1.7	15	24
06/07/2004	12:06	Ebb	4.5	14	24
07/26/2004	11:35	Flood	1.7	18	24
08/23/2004	14:01	Ebb	4.5	17	30
09/27/2004	12:19	Flood	22	13	18
10/25/2004	12:21	Flood	1.7	11	30
11/01/2004	12:35	Ebb	23	10	28
11/30/2004	11:49	Ebb	4.5	7	18
01/04/2005	13:35	Ebb	1.7	5	20
03/21/2005	13:22	Flood	1.7	9	30
04/26/2005	11:34	Ebb	1.7	12	25
05/02/2005	12:12	Flood	1.7	13	20
07/11/2005	12:30	Ebb	1.7	14	30
08/16/2005	12:15	Flood	49	16	28
09/26/2005	12:37	Flood	1.7	14	28
10/03/2005	11:57	Ebb	1.7	12	32
11/01/2005	13:14	Flood	1.7	11	28
02/27/2006	12:02	Flood	1.7	7	25

**Number of Samples: 32**

**Geometric Mean: 2.8**

**Range: 1.7 - 49**

**Estimated 90th Percentile: 9**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **280**

Classification: **Unclassified**

<b>Sample Date</b>	<b>Sample Time</b>	<b>Tide</b>	<b>Fcoli/100ml</b>	<b>Temperature</b>	<b>Salinity</b>
11/12/2002	11:40	Flood	2	11	30
01/06/2003	12:31	Ebb	1.7	7	28
02/24/2003	11:48	Ebb	1.7	7	24
05/27/2003	11:03	Flood	2	14	25
06/09/2003	12:48	Flood	1.7	15	22
07/08/2003	12:01	Flood	2	16	26
08/04/2003	11:49	Ebb	1.7	16	26
09/02/2003	12:38	Ebb	1.7	17	28
10/27/2003	11:09	Ebb	1.7	11	10
11/18/2003	13:25	Ebb	2	9	22
12/15/2003	11:57	Ebb	1.7	8	24
01/20/2004	12:58	Flood	2	7	18
02/17/2004	11:40	Flood	1.8	7	25
03/29/2004	11:39	Ebb	1.7	9	28
04/12/2004	12:31	Ebb	1.7	13	25
05/18/2004	12:16	Flood	2	16	25
06/07/2004	12:23	Ebb	2	14	25
07/26/2004	11:53	Flood	1.7	19	25
08/23/2004	14:19	Ebb	1.7	17	30
09/27/2004	12:36	Flood	2	14	18
10/25/2004	12:36	Flood	1.7	11	28
11/01/2004	12:55	Ebb	1.7	10	28
11/30/2004	12:09	Ebb	2	7	22
01/04/2005	13:19	Ebb	1.7	5	20
03/21/2005	13:09	Flood	1.7	9	28
04/26/2005	11:52	Ebb	1.7	13	25
05/02/2005	12:27	Flood	1.7	13	24
07/11/2005	12:55	Ebb	1.7	15	30
08/16/2005	12:33	Flood	1.7	17	28
09/26/2005	12:53	Flood	1.7	14	30
10/03/2005	12:13	Flood	1.7	12	30
11/01/2005	13:27	Flood	2	11	30
02/27/2006	12:20	Flood	1.7	7	25

**Number of Samples: 33**

**Geometric Mean: 1.7**

**Range: 1.7 - 2**

**Estimated 90th Percentile: 1**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **281**

Classification: **Unclassified**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:44	Flood	2	11	30
01/06/2003	12:34	Ebb	1.7	7	28
02/24/2003	11:52	Ebb	1.7	7	24
05/27/2003	11:06	Flood	2	14	25
06/09/2003	12:46	Flood	4.5	14	22
07/08/2003	12:04	Flood	2	16	25
08/04/2003	11:54	Ebb	1.7	16	28
09/02/2003	12:34	Ebb	1.7	17	28
10/27/2003	11:06	Ebb	1.7	11	10
11/18/2003	13:22	Ebb	2	9	22
12/15/2003	12:00	Ebb	2	8	24
01/20/2004	13:00	Flood	2	7	18
02/17/2004	11:43	Flood	1.7	7	25
03/29/2004	11:43	Ebb	1.7	9	28
04/12/2004	12:34	Ebb	1.7	13	25
05/18/2004	12:21	Flood	1.7	16	25
06/07/2004	12:26	Ebb	1.7	14	25
07/26/2004	11:57	Flood	1.7	20	25
08/23/2004	14:23	Ebb	1.7	17	30
09/27/2004	12:40	Flood	2	14	18
10/25/2004	12:40	Flood	1.7	11	28
11/01/2004	12:59	Ebb	2	10	28
11/30/2004	12:12	Ebb	1.7	7	24
01/04/2005	13:13	Ebb	1.7	5	22
03/21/2005	13:05	Flood	1.7	9	30
04/26/2005	11:57	Ebb	1.7	13	25
05/02/2005	12:30	Flood	2	13	24
07/11/2005	12:58	Ebb	1.7	15	30
08/16/2005	12:37	Flood	1.7	17	28
09/26/2005	12:57	Flood	1.7	14	30
10/03/2005	12:16	Flood	1.7	12	30
11/01/2005	13:30	Flood	1.7	11	30
02/27/2006	12:24	Flood	1.7	7	25

**Number of Samples: 33**

**Geometric Mean: 1.8**

**Range: 1.7 - 4.5**

**Estimated 90th Percentile: 2**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **282**

Classification: **Unclassified**

Sample Date	Sample Time	Tide	Fcoli/100ml	Temperature	Salinity
11/12/2002	11:49	Flood	1.7	11	30
01/06/2003	12:39	Ebb	1.7	7	29
02/24/2003	11:57	Ebb	1.7	7	22
05/27/2003	11:12	Flood	2	14	25
06/09/2003	12:43	Flood	4	14	25
07/08/2003	12:09	Flood	1.7	16	25
08/04/2003	11:58	Ebb	1.7	16	28
09/02/2003	12:29	Ebb	1.7	17	28
10/27/2003	11:04	Ebb	4.5	11	10
11/18/2003	13:19	Ebb	1.7	9	22
12/15/2003	12:04	Ebb	2	8	24
01/20/2004	13:06	Flood	1.7	7	18
02/17/2004	11:47	Flood	2	7	25
03/29/2004	11:46	Ebb	1.7	9	28
04/12/2004	12:37	Ebb	1.7	13	25
05/18/2004	12:25	Flood	1.7	16	25
06/07/2004	12:31	Ebb	1.7	14	25
07/26/2004	12:01	Flood	1.7	20	25
08/23/2004	14:27	Ebb	1.7	17	30
09/27/2004	12:47	Flood	2	14	18
10/25/2004	12:44	Flood	1.7	11	30
11/01/2004	13:04	Ebb	1.7	10	26
11/30/2004	12:17	Ebb	1.7	7	22
01/04/2005	13:09	Ebb	1.7	4	22
03/21/2005	13:00	Flood	1.7	8	29
04/26/2005	12:01	Ebb	1.7	13	25
05/02/2005	12:34	Flood	1.7	13	25
07/11/2005	13:03	Ebb	1.7	15	30
08/16/2005	12:42	Flood	2	18	28
09/26/2005	13:03	Flood	2	14	30
10/03/2005	12:20	Flood	4.5	12	30
11/01/2005	13:33	Flood	11	11	28
02/27/2006	12:29	Flood	1.7	7	25

**Number of Samples: 33**

**Geometric Mean: 2.0**

**Range: 1.7 - 11**

**Estimated 90th Percentile: 3**

**SUMMARY OF SHELLFISH GROWING AREAS  
WATER QUALITY STUDY RESULTS**

Growing Area: **HOLMES HARBOR**

Sampling Station Number: **283**

Classification: **Unclassified**

<b>Sample Date</b>	<b>Sample Time</b>	<b>Tide</b>	<b>Fcoli/100ml</b>	<b>Temperature</b>	<b>Salinity</b>
12/16/2002	12:56	Flood	2	10	30
01/06/2003	13:11	Ebb	1.7	7	25
02/24/2003	12:25	Ebb	1.7	7	24
05/27/2003	11:40	Flood	1.7	14	25
06/09/2003	12:17	Flood	1.7	15	22
07/08/2003	12:39	Flood	1.7	16	28
08/04/2003	11:40	Ebb	1.7	15	28
09/02/2003	11:59	Ebb	2	15	30
10/27/2003	10:39	Ebb	7.8	11	10
11/18/2003	12:54	Ebb	1.7	9	22
12/15/2003	11:11	Ebb	1.7	8	20
01/20/2004	13:30	Flood	1.7	7	15
02/17/2004	12:15	Flood	1.7	7	25
03/29/2004	12:15	Ebb	1.7	10	26
04/12/2004	13:02	Ebb	1.7	13	22
05/18/2004	12:59	Flood	1.7	16	22
06/07/2004	12:55	Ebb	1.7	14	24
07/26/2004	12:26	Flood	1.7	20	25
08/23/2004	11:26	Flood	1.7	16	28
09/27/2004	13:17	Flood	1.7	14	18
10/25/2004	13:12	Flood	2	11	28
11/01/2004	11:23	Ebb	1.7	10	26
11/30/2004	12:45	Ebb	1.7	7	20
01/04/2005	12:42	Ebb	1.7	5	20
03/21/2005	12:21	Flood	1.7	9	30
04/26/2005	12:33	Ebb	1.7	13	25
05/02/2005	12:57	Flood	1.7	13	22
07/11/2005	13:30	Ebb	1.7	14	30
08/16/2005	13:08	Flood	1.7	17	28
09/26/2005	13:27	Flood	2	14	30
10/03/2005	12:59	Flood	4.5	12	30
11/01/2005	13:57	Flood	1.7	11	28
02/27/2006	12:58	Flood	1.7	7	24

**Number of Samples: 33**

**Geometric Mean: 1.8**

**Range: 1.7 - 7.8**

**Estimated 90th Percentile: 2**