

SHELLFISH GROWING AREA MONITORING PROGRAM

STANDARD OPERATING PROCEDURES

**RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES**



Photo courtesy of the Commercial Fisheries Research Foundation

June 2023

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Definitions

Actual Source	Shall mean any source that currently exists in fact or is present at the time of the sanitary survey.
Approved	A shellfish water quality classification that is used to identify a growing area where harvest for direct marketing and human consumption is allowed.
Authority	Shall mean the State of Rhode Island Department of Environmental Management by agreement with the Rhode Island Department of Health which share responsibility for the enforcement of the NSSP code in Rhode Island.
Conditionally Approved	A shellfish water quality classification that is used to identify a growing area which meets the criteria for the approved classification except under certain conditions described in a management plan.
Controlled Relay	Shall mean to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process. This process of shellfish transplant via controlled relay is only allowed under direct supervision of the authority and as outlined in the program's controlled relay supporting documentation.
Dealer	Shall mean a person to whom certification is issued for the activities of shellstock shipper, shucker-packer, repacker, reshipper, or depuration processor.
Direct Source	Shall mean a source of pollution to the shellfish growing area that discharges whether actually or potentially directly to those receiving waters.
Direct Marketing	Shall mean the sale for human consumption of shellfish which: (a) Does not require depuration or relaying prior to sale; or (b) Has been subjected to depuration or relaying activities.
FDA	Shall mean the United States Food and Drug Administration.
Geometric Mean	Shall mean the antilog (base 10) of the arithmetic mean of the logarithm (base 10) of sample results as calculated according to NSSP guidance.
Growing Area	A saltwater body of the state of Rhode Island that has been delineated and assessed as to its ability to support or has the potential to support the propagation of shellstock by natural or artificial means.

Harvest	Shall mean the act of removing shellstock from growing areas and its placement on or in a manmade conveyance or other means of transport.
Harvester	Shall mean a person who takes shellstock by any means from a growing area.
Indirect Source	Shall mean a pollution source that may actually or potentially impact the shellfish growing area receiving waters in a non-direct way, i.e. overland, via a secondary conveyance or by nature of its source such as deposition or rainfall.
Interstate Certified Shellfish Shippers List (ICSSL)	Shall mean an FDA publication of shellfish dealers, domestic and foreign, who have been certified by a state or foreign Authority as meeting the public health control measures specified in the NSSP Ordinance.
Interstate Shellfish Sanitation Conference (ISSC)	Shall mean the organization which consists of agencies from shellfish producing and receiving States, FDA, the shellfish industry, the National Marine Fisheries Service of the United States, Department of Commerce, and the EPA. The ISSC provides the formal structure wherein Rhode Island regulatory authorities i.e., RIDEM and RIDOH, with FDA concurrence, can establish updated guidelines and procedures for sanitary control of the shellfish industry.
License	Shall mean the document issued by the Authority to a person to harvest or transport shellstock for commercial sale. [In those States issuing permits as opposed to licenses, the term license would be replaced with the term "permit" which would be defined the same as "license".]
Marina	Shall mean any water area with a structure (docks, basin, floating docks, etc.) which is: (a) Used for docking or otherwise securing vessels; and (b) Constructed to provide temporary or permanent docking space for more than ten (10) boats.
Mooring Area	Mooring area means a location in which vessels are kept in place via permanent anchor and line or cable systems without any floating or fixed wharves, docks or gangways.
MPN (Most Probable Number)	Shall mean a statistical estimate of the number of bacteria per unit volume and is determined from the number of positive results in a series of fermentation tubes.
National Shellfish Sanitation Program (NSSP)	Shall mean the cooperative State-FDA-Industry program for the sanitary control of shellfish that is adequate to ensure that the shellfish produced in accordance with these guidelines will be safe and sanitary.
Open Water Aquaculture	Shall mean the cultivation of bivalve shellfish in natural shellfish growing areas.

Point Source	Shall mean any discernible, confined and discrete conveyance including any pipe, ditch, channel, tunnel or conduit that carries pollution.
Potential Source	Shall mean any source that may currently exist in fact but is not impacting the receiving waters at the time of the sanitary survey. i.e. a drainage pipe that is not flowing at the time of inspection but has the potential to convey storm water under certain conditions.
Prohibited	A shellfish water quality classification used to identify a growing area where the harvest of shellstock for any purpose, except depletion or gathering of seed for aquaculture, is not permitted.
Raw	Shall mean shellfish that have not been thermally processed: (a) to an internal temperature of 145 °Fahrenheit or greater for 15 seconds (or equivalent); or (b) altering the organoleptic characteristics.
Relay	Shall mean to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process. The RI shellfish authority does not allow any relay of shellstock other than relays conducted under their direct supervision as a controlled relay project.
Restricted	A shellfish water quality classification used to identify a growing area where harvesting shall be by special license and the shellstock, following harvest, is subjected to a suitable and effective treatment process through relaying or depuration.
Sanitary Survey	Shall mean the written evaluation report of all environmental factors, including actual and potential pollution sources, which have a bearing on the water quality in a shellfish growing area.
Shall	Means mandatory and required.
Shellfish	Shall mean all species of filter-feeding mollusks, to include: (a) Oysters, clams or mussels, whether: (i) Shucked or in the shell; (ii) Raw, including post-harvest processed; (iii) Frozen or unfrozen; (iv) Whole or in part; and (b) Scallops in any form, except when the final product form is the adductor muscle only.
Shellfish Gardening	Shall mean a non-commercial shellfish culture for the purposes of enhancing water quality or enhancing natural stocks. Shellfish cultured in a shellfish garden are not to be sold or used for human consumption.

Shellstock	Shall mean live molluscan shellfish in the shell.
Should	Shall mean recommended but is not required.

1. Introduction

The regulation of the state's shellfish industry is the responsibility of the Rhode Island Department of Environmental Management (RIDEM), Rhode Island Department of Health (RIDOH) and Coastal Resource Management Council (CRMC) as set forth in the General Laws of the State of Rhode Island (RIGL Title 20, RIGL Chapters 42-17.1, 42-17.6, and 42-17.7, and in accordance with RIGL Chapter 42-35, Administrative Procedures Act). State law grants authority to the DEM Director and appointed agents of RIDEM to regulate shellfish grounds, the growing and taking of shellfish (RIGL Chapter 20-8.1 – "Shellfish Grounds"), and authority to the Director and duly appointed agents of RIDOH to regulate the sale of shellfish in Rhode Island (RIGL Chapter 21-14 – "Shellfish Packing Houses").

The RIDEM Office of Water Resources (OWR) is responsible for the classification and water quality survey of the state's marine waters for filter-feeding molluscan shellfish harvest. The OWR conducts routine bacteriological monitoring, marine phytoplankton biotoxin monitoring and pollution source inventories of the state's shellfish growing waters in order to maintain certification of these waters for the harvest of shellfish for direct human consumption. These responsibilities implement part of the State of Rhode Island's agreement with the United States Food and Drug Administration (FDA) National Shellfish Sanitation Program (NSSP) to maintain national health standards through regulation of the interstate shellfish industry. Both RIDEM and RIDOH are among state shellfish control authorities (SSCA), along with representatives from federal agencies and the shellfish industry that make up the Interstate Shellfish Sanitation Conference (ISSC). The ISSC's purpose is to foster and improve the sanitation of shellfish in this country, to encourage restoration of shellfish growing areas and to facilitate the adoption of sound, uniform methods into the NSSP Model Ordinance. Direction for the conference is under the control of the various state shellfish control authorities (SSCA), federal agencies and the shellfish industry.

The NSSP requires that the state maintain data and files that will provide evidence and demonstrate the effective administrative management of the state's shellfish sanitary control program. States shall keep records in a central file, which will facilitate the FDA review of their shellfish sanitation program and shall assist the FDA in making such reviews. When different state agencies are involved in the sanitary control of the shellfish industry, a clear statement of each agency's responsibilities should be developed in the form of a memorandum of understanding (MOU). RIDEM's OWR, Division of Marine Fisheries (DMF), Division of Law Enforcement (DLE), RIDOH and the Coastal Resource Management Council (CRMC) have entered into MOUs. Copies of these MOUs are in the attached Appendices.

This document describes the standard operating procedures utilized by the Office of Water Resources (OWR) in implementing the elements of the shellfish sanitation program for which this division is responsible.

2. Growing Area Classifications

According to the NSSP a shellfish growing area is defined as any site that supports or could support the propagation of shellfish stock by natural or artificial means. Growing areas shall be delineated and assessed and be correctly designated with one of the following shellfish water quality classifications:

A. Approved

Growing areas may be designated as approved when the sanitary survey finds that the area is safe for the direct marketing of shellfish, is not subject to contamination from human or animal fecal matter (at levels that, in the judgment of the SSCA, presents an actual or potential public health hazard), and is otherwise not contaminated with pathogenic organisms, marine biotoxins, poisonous or deleterious substances or bacteria concentrations that exceed the bacteriological standards for the approved classification as established by the NSSP.

B. Conditionally Approved

Conditionally Approved means a classification used to identify a growing area that meets the criteria for the approved classification except under certain conditions described in a management plan. Growing areas that are subject to intermittent microbiological pollution may be classified as conditionally approved. This option is voluntary and may be used when the suitability of an area for harvesting shellfish for direct marketing is affected by a predictable pollution event. The pollution event may be predicated upon certain meteorological conditions (i.e., rainfall) or attainment of an established performance standard by wastewater treatment facilities discharging effluent, directly or indirectly, into the area. In other cases, the sanitary quality of an area may be affected by seasonal population, non-point source pollution, or sporadic use of a dock or harbor facility. All conditionally approved growing areas must have a written management plan of operation that includes details describing the type of pollution source impacting the growing area and the specific conditions that will place the growing area into the closed status. Additionally, the area must be open for a reasonable period of time and the factors determining that period must be known, predictable and not so complex as to preclude a reasonable management approach. RI currently has six conditionally approved shellfish areas and the conditional area management plans for those areas are in the OWR shellfish growing area monitoring program permanent files, Conditional area management plans are evaluated annually and updated as needed.

C. Conditionally Approved (Seasonal)

Waters having seasonally impacted water quality may require a seasonal closure. For example, a harbor in an unpopulated area which is used for anchoring several months a year may have reduced sanitary water quality when numerous vessels are present, and acceptable water quality during periods when the number of vessels is reduced. A seasonal shellfish harvest closure would be required during periods having unacceptable water quality.

For a growing area to be seasonally approved, water quality data must meet criteria while the area is in the seasonally open status. Seasonally approved shellfish growing areas may be impacted by intermittent pollution due to meteorological, hydrographic, or population increase that causes a seasonal change in water quality. For example, the sanitary quality of an area may be affected by seasonal population, seasonal non-point source pollution, or seasonal use of a

dock or harbor facility. In Rhode Island, waters impacted by seasonal usage have been classified as seasonally approved and are only open during months when the potential pollution sources are absent and water quality in the growing area meets NSSP criteria for the approved classification.

Systematic random sampling is used to monitor seasonally approved growing areas to capture water quality conditions under the full range of meteorological, hydrographic, and pollution conditions. This sampling strategy and data analysis assumes that any intermittent changes in water quality that may occur will be captured in the bacteriological sampling results. Sampling must include at least two (2) water samples per year being collected while the area is in the open status and one (1) set of samples being collected within thirty (30) days prior to the seasonal reopening date. Rhode Island seasonally approved areas are sampled on the same schedule as the adjacent approved waters of the growing area.

D. Prohibited

The SSCA shall not permit the harvest of shellstock from any area classified as prohibited, except for the harvest of shellstock for the gathering of seed for aquaculture or the depletion of the areas classified as prohibited. The SSCA shall ensure that shellstock removed from any growing area classified as prohibited are effectively excluded from human consumption unless it is seed to be cultured as outlined in the NSSP model ordinance and the regulations governing the [Aquaculture of Marine Species in Rhode Island Waters \(250-RICR-40-00-1\)](#).

An area shall be classified as prohibited if 1) there is no current sanitary survey, or 2) a sanitary survey determines that the area is adjacent to a waste water treatment facility (WWTF) outfall or other point source outfall with public health significance, or 3) the area is adjacent to pollution sources that may be unpredictable and may contaminate the area, or 4) the area is so contaminated with fecal waste such that shellfish may be vectors for disease microorganisms, or 5) the concentration of marine biotoxins is sufficient to cause a public health risk or 6) the area is contaminated with poisonous or deleterious substances that may cause shellfish to be contaminated.

There are no minimum requirements within the NSSP MO for sampling of prohibited waters. However, RIDEM regularly monitors established stations within prohibited waters of some growing areas to track changes in microbial water quality.

E. Restricted

The restricted classification is used to identify a growing area where harvesting shall be by special license and the shellstock, following harvest, is subjected to a controlled, suitable and effective treatment process through controlled relay or depuration. An area may be classified as restricted when a sanitary survey indicates a limited degree of pollution. Waters placed in the restricted classification must meet the monitoring and bacteriological standards outlined in the NSSP MO.

F. Conditionally Restricted

Growing areas that are subject to intermittent microbiological pollution may be classified as conditionally restricted. This option is voluntary and may be used when the suitability of an area for harvesting shellfish for relaying and depuration is affected by a predictable pollution event.

The pollution event may be predicated upon the attainment of an established performance standard by wastewater treatment facilities discharging effluent, directly or indirectly, into the area. In other cases, the sanitary quality of an area may be affected by meteorological events, a seasonally fluctuating population, non-point source pollution, or sporadic use of a dock or harbor facility. Waters placed in the conditionally restricted classification must meet the monitoring and bacteriological standards outlined in the NSSP MO.

3. Growing Areas

Rhode Island conducts bacteriological monitoring in twenty (20) defined shellfish growing areas (Table 1). Four (4) areas (GA2, GA7-2, GA12, GA15) highlighted in red in Table 1 are areas currently classified as Prohibited in their entirety, six (6) areas are classified as conditionally approved either in part (GA1, GA10, GA16) or in their entirety (GA5, GA8, GA17). The remaining ten (10) areas (GA3, GA4, GA6, GA7, GA9, GA11QW, GA11NG, GA13, GA14E, GA14W) are operated as approved (highlighted in blue in Table 1). Within each of the growing areas, waters may include limited areas that are seasonally closed or are classified as prohibited.

Table 1: Shellfish classifications for twenty (20) defined Rhode Island shellfish growing areas monitored by RIDEM OWR. A = approved, CA = conditionally approved, P = prohibited, SA = seasonally approved classification.

GA 1 (CA)	Upper Narragansett Bay Areas 1A & 1B (Area 1A is Conditionally Approved, Area 1B is Approved)	GA 10 (CA)	Point Judith Pond (Conditionally Approved and Approved areas) and Potter Ponds (Approved)
GA 2 (P)	Barrington, Palmer, and Warren Rivers	GA 11QW (A)	Quonochontaug and Winnapaug Ponds
GA 3 (A)	East Middle Bay	GA 11NG (A)	Ninigret and Green Hill Ponds
GA 4 (A)	Sakonnet River	GA 12 (P)	Little Narragansett Bay
GA 5 (CA)	Kickemuit River (Conditionally Approved)	GA 13 (A/SA)	Block Island
GA 6 (A)	East Passage	GA 14W (A)	Offshore Napatree to Point Judith (Including Block Island)
GA 7 (A)	West Passage	GA 14E (A)	Offshore Point Judith to Westport
GA 7-2 (P)	Pettaquamscutt River (Narrow River)	GA 15 (P)	Seekonk River
GA 8 (CA)	Greenwich Bay (Conditionally Approved)	GA 16 (CA)	Providence River (Lower Providence River Area E is Conditionally Approved; remainder of area is Prohibited)
GA 9 (A)	West Middle Bay	GA 17 (CA)	Mount Hope Bay (Conditionally Approved)

4. Fecal Coliform Monitoring: Sample Collection and Analysis

Surface water samples for fecal coliform analysis are collected by RIDEM OWR personnel, or in the case of Block Island waters (GA13 and offshore Block Island GA 14W), by the town of New Shoreham's Harbor Master Office's staff. For every set of samples collected, a description of field conditions is recorded, which includes tidal stage, wind direction and speed, number of days since last rain and the rainfall total, the status of conditional areas (open or closed), any important observations such as flocks of birds or water-discoloring algae blooms, water temperature and collection time at each sampling station. Water temperature is recorded by either calibrated hand-held thermometer or the sampling vessels' onboard electronic thermometer (Garmin chart plotter).

Water samples are analyzed by the RIDOH Water Microbiology Laboratory for the presence of fecal coliform bacteria. RIDOH uses the procedures as prescribed by the American Public Health Association in "Standard Methods for the Examination of Water and Wastewater" (APHA, 1995) for the standard fecal coliform membrane filtration method (sm48 mTEC) utilized exclusively since August 2012 and/or the multiple tube fermentation test (sm01 MPN) method utilized prior to August 2012. During the 2012 MPN to mTEC transition period results from the different analytical methods were co-mingled and statistical analysis was performed according to the "SOP MPN to mTEC Transition" document dated August 2012 (RIDEM, 2012, on file in the program's permanent files).

A. Water Sample Collection Procedure

The procedure for fecal coliform water sample holding times and temperature control for the sm48 mTEC method used since August of 2012 is as follows:

- Samples are collected using aseptic techniques by RIDEM OWR staff or other responsible parties using pre-sterilized 125 mL samples bottles (or approved equivalent) as provided by the RI Department of Health Laboratory. Prior to sampling, sample bottles are labeled with permanent marker to indicate the growing area and station number.
- Fecal coliform water samples are collected by placing the sample bottle in a sample collecting stick and dipping the stick approximately 0.5 meter below the surface. The bottle is swept forward in one smooth motion and removed from the water. The sample bottle should be filled to the fill line marked on the shoulder of the bottle. The water sample is capped aseptically and immediately placed on ice in an insulated cooler.
- A separate surface water sample in a 'Temperature Blank' labelled bottle is collected at the time of the first sample collection of the day in each growing area for both water column monitoring samples and shoreline survey samples. Water temperature of the temperature blank is recorded at the time of collection with a NIST-certified, traceable thermometer that meets ISO standard 17025. The traceability and calibration certificate for thermometers is on file at DEM OWR Shellfish Office. Thermometers are recalibrated by RI DOH annually.
- The date and time are recorded for each sample collected and the water temperature is recorded for the first sample (temperature blank) collected daily. The temperature blank is placed on ice with collected water samples in an insulated cooler. Data are clearly entered onto a field data sheet.
- Upon collection of a sample from source water, (freshwater, seawater, wastewater or

other pollution source water), the sample is placed on ice and maintained at a temperature of 1-10° C during field operations, in transit, and while at RIDOH's Laboratory's Central Receiving.

- Upon receipt at the laboratory, the temperature of the temperature blank is determined by RIDOH receiving staff. Initial sample collection temperature and as received temperature are recorded on the RI DOH sample submission form. As received temperature should not be greater than the first sample water temperature.
- Once received at RI DOH, the samples are held in a refrigerator at 0-4⁰C.
- The maximum holding time from time of collection is thirty (30) hours for water samples to be analyzed by the sm48 mTEC method.

The results of all bacteriological monitoring – whether collected as part of the routine bacteriological monitoring program or shoreline survey program – are evaluated by RIDEM OWR staff as they are received from the RI DOH. Any unusual or exceptionally elevated values are further evaluated to determine the need for additional sampling and/or investigation.

B. Routine Bacteriological Monitoring Program

The Department uses systematic random sampling for bacteriological evaluation of most of the State's shellfish growing waters regardless of their classification (Approved, Seasonally Approved, Conditionally Approved). This requires that sample collection be scheduled sufficiently far in advance to support random collection with respect to environmental conditions. The Model Ordinance requires that, prior to implementation, the schedule for random sampling shall be documented in the program's master files. If conditions at the time of the scheduled sample collection are believed to be hazardous to the safety of the sampling team, sample collection shall be completed at a later date as near to the original sample date as practical. This systematic random sampling schedule is established at the beginning of each calendar year and the schedule is maintained in the program's permanent files.

The 'offshore' waters (GA14E and GA14W) of coastal RI out to the 3-mile limit of state waters were formerly considered remote and were sampled with a reduced sampling frequency. In 2021 an FDA review indicated that these waters were no longer eligible for remote status. In 2022 a transition to APC (Adverse Pollution Conditions) sampling was started for GA14 waters. This transition includes the NSSP required five times per year sample frequency and addition of sample stations at the most adverse pollution locations (WWTF outfall locations, the mouth of the East Passage, West Passage, Sakonnet River) in the growing area. The routine bacteriological monitoring program follows NSSP MO guidance appropriate for the classification of each growing area, as summarized below

i. Approved Areas

A minimum of six (6) random samples shall be collected annually from each sample station in each growing area classified as approved, including those stations within those adjacent waters that are classified as prohibited or seasonally approved. Water sample collection stations have been established to assure that the number and location of stations are adequate to characterize water quality conditions and effectively evaluate all pollution sources. The most recent thirty (30) samples are evaluated for compliance with NSSP criteria in the annual classification review.

Further analyses of results are conducted in seasonally approved waters to ensure compliance with NSSP water quality standards during periods that the seasonal area is in the open status.

ii. Conditionally Approved Areas

Growing areas that are subject to intermittent microbiological pollution may be classified as conditionally approved. This option is voluntary and may be used when the suitability of an area for harvesting shellfish for direct marketing is affected by a predictable pollution event such as rainfall-induced runoff. The pollution event may be predicated upon the attainment of an established performance standard by wastewater treatment facilities discharging effluent, directly or indirectly, into the area. In other cases, the sanitary quality of an area may be affected by seasonal population, non-point source pollution, or sporadic use of a dock or harbor facility. Conditionally approved areas are sampled using a systematic random sampling plan, which is a pre-established sampling plan that is organized at the beginning of each calendar year. The sampling plan includes the minimum number of samples collected annually as described in the Model Ordinance (NSSP, 2019). For conditional areas impacted by non-point sources a minimum of six (6) samples will be collected annually on randomly selected dates when the area is in the open status. For conditional areas potentially impacted by point sources (such as WWTF) the growing area will be sampled a minimum of one (1) time monthly for a total of twelve (12) samples per year when the area is in the open status.

iii. Seasonally Approved Areas

When the conditional management plan is based on the seasonal opening and closing of an area, and the area is in the open status for a predetermined period of less than six (6) months, a minimum of five (5) sets of water samples are required (for Adverse Pollution Condition and Systematic Random Sampling). All samples shall be collected while the area is in the open status unless the Authority has historical water quality data to demonstrate that the area meets open status criteria while in the closed status. If closed status samples are used to meet the minimum sample requirements, they must be collected within thirty (30) days prior to the area being placed in the open status.

A systematic random sampling plan is used for both restricted and approved shellfish growing areas that are intermittently impacted by pollution events. This field sampling plan and data analysis assumes a statistical representation of all meteorological, hydrographic, and/or other pollution events will be incorporated within the data set, therefore all data collected must be used during classification. The data set may also be used to classify shellfish growing areas influenced by seasonal water uses or where harvesting is controlled by seasonal resource management restrictions.

OWR currently manages six (6) shellfish growing areas under the Conditionally Approved classification: GA1, GA5, GA8, GA10, GA16 and GA17. In addition, portions of nine (9) growing areas (GA3, GA4, GA5, GA7, GA10, GA11NG, GA11QW, GA13 and GA14E) have seasonal closures associated with marina activities or other seasonal conditions that have the potential to cause violations of the water quality standard. These waters are sampled when in the open status six (6) times per year if the potential pollution sources are non-point sources or twelve (12) times per year if the potential pollution sources are point sources such as WWTF. The one exception to this is the Block Island Great Salt Pond growing area (GA13) which is

sampled twelve (12) times per year in a cooperative agreement with the Block Island Harbors Department. At least 50% of the sample results analyzed from those stations located within the seasonal marina closure areas must be collected when these areas are in the open status.

iv. Prohibited Areas

A growing area shall be classified as prohibited if there is no current sanitary survey or if the sanitary survey or other monitoring program data indicate that fecal material, pathogenic microorganisms, poisonous or deleterious substances, marine biotoxins, or radionuclides may reach the area in excessive concentrations. The taking of shellfish for any human food purposes from such areas shall be prohibited. Most growing areas in the approved and conditionally approved classification also have some prohibited area within their boundaries (see “Shellfish Closure Area Maps”, Appendix E).

A summary of the number of monitoring stations, frequency of routine monitoring and total number of samples collected per year in each RI shellfish growing area is given in Table 2.

Table 2: Number of monitoring stations and frequency of monitoring in RI shellfish growing areas.

Growing Area	Name	Total # Sampling Stations within Growing Area	# Times sampled per year (routinely)	Total number of samples per year	# Of Sampling Stations with Approved Status	# Of Sampling Stations with Conditional status	# Of Sampling Stations with Conditional Seasonal status	# Of Sampling Stations with Prohibited status
GA 1	Upper Narragansett Bay	16	12	192	4	12		2
GA 2	*Barrington Palmer and Warren Rivers	14	2-4	28-56	0			14
GA 3	East Middle Bay	22	6	132	15		2	5
GA 4	Sakonnet River	22	6	132	18		1	3
GA 5	Kickemuit River	10	12	120		9		1
GA 6	East Passage	27	6	162	10			17
GA 7	West Passage	13	6	78	8		2	3
GA 7-2	*Narrow River (Pettaquamscutt River)	5	12	60				5
GA 8	Greenwich Bay	20	12	240		10		10
GA 9	West Middle Bay	13	6	78	10			3
GA 10	Point Judith and Potter Ponds	26	6	156	12	5		9
GA 11QW	Quonochontaug and Winnapaug Ponds	18	6	108	18			
GA 11NG	Ninigret and Green Hill Ponds	25	6	150	11			14

Growing Area	Name	Total # Sampling Stations within Growing Area	# Times sampled per year (routinely)	Total number of samples per year	# Of Sampling Stations with Approved Status	# Of Sampling Stations with Conditional status	# Of Sampling Stations with Conditional Seasonal status	# Of Sampling Stations with Prohibited status
GA 12	Little Narragansett Bay	15	6	90	1			14
GA 13	Block Island (sampled 12 times per year)	16	12	192	6		10	
GA 14 E	Offshore Point Judith to Westport	9	5	45	8			1
GA 14 W	Offshore from Napatree Point to Point Judith including offshore Block Island	15	5	75	12			3
GA 15	Seekonk River	11	0	0				11
GA 16	Providence River	14	6 stations (Area E) 12 times	72		2		12
GA 17	Mt Hope Bay	16	12	192		4		12
Total number of samples per year:				2,330				
* Prohibited area - No minimum sampling required								

5. Bio Toxin Monitoring

A. Monitoring Protocol

RIDEM OWR routinely monitors the marine waters of the state for the presence of potentially toxic Harmful Algal Blooms (HAB). The most recent RIDEM Harmful Algal Bloom and Shellfish Biotxin Monitoring and Contingency Plan (2021) details RIDEM's sampling scheme with a yearly collection of approximately 224 routine samples throughout Narragansett Bay and the Salt Ponds including the Great Salt Pond on Block Island. In addition to the routine HAB monitoring, increased synoptic sampling occurs during the May – October period when an increase in potential HAB phytoplankton abundance may occur. The synoptic sampling includes approximately one (1) sampling cruise per month for a total of six (6) cruises per year, in which multiple growing areas are sampled in a single day. The areas targeted for synoptic sampling are Upper Narragansett Bay, Lower Narragansett Bay (East and West Passage), Sakonnet Passage, coastal ponds and Block Island. The six (6) annual HAB synoptic cruises add approximately one hundred and thirty-eight (138) additional HAB phytoplankton samples per year to the HAB monitoring plan (annual routine HAB phytoplankton sample total is approximately 362 samples). RI's HAB plan is available at:

<https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/water/shellfish/pdf/habplan.pdf>

A summary of the plan is as follows:

- A. RIDEM OWR will collect water samples for phytoplankton identification year-round (January to December). RIDEM OWR will schedule phytoplankton sample collection in conjunction with their routine bacteriological systematic random sampling schedule. The sample stations and frequency has been determined by RIDEM OWR and made part of the monitoring and contingency plan. Approximately 224 routine HAB samples are collected annually.
- B. RIDEM OWR along with the RIDEM – Division of Marine Fisheries (DMF) staff will increase sampling frequency to an additional six (6) synoptic HAB phytoplankton cruises with approximately one (1) per month during May through October. This is the time period which historically tends to have a higher potential for increased HAB abundance occurring. The synoptic sampling adds an additional one hundred and thirty-eight (138) samples to the routine HAB phytoplankton monitoring.
- C. RIDEM OWR will deliver the sample(s) to the RIDOH Water Microbiology Laboratory with the appropriate sample form(s).
- D. The RIDOH Water Microbiology Laboratory will analyze the samples for identification and abundance and forward findings to RIDEM - OWR. If biotoxin organisms are identified at or above 1,000 cells L⁻¹ for *Alexandrium* spp., 30,000 cells L⁻¹ for *Dinophysis* spp., or 20,000 cell L⁻¹ for *Pseudo-nitzschia* spp. the RIDOH lab shall immediately notify RIDEM OWR. RIDOH will screen the sample using immunoassay kits for specific toxins produced by the HAB plankton identified. If the results come back positive for toxins in the plankton the Contingency Plan is enacted.

In the event that monitoring detects an elevated level of potentially harmful phytoplankton the Contingency Plan will be initiated. Details of those steps to be taken by all parties are described in the RI Harmful Algal Bloom and Shellfish Biotxin Monitoring and Contingency Plan (Appendix D).

6. *Vibrio* Management

Vibrio parahaemolyticus and *Vibrio vulnificus* controls are important to ensure shellfish seafood safety. The state of Rhode Island has had limited sporadic cases of *Vibrio* linked to the consumption of shellfish collected within the state during the past ten (10) years. According to the NSSP 2019 guidelines, a Risk Evaluation is required on an annual basis to determine whether the consumption of shellfish from each of the growing areas has a likelihood of leading to infection. This Risk Evaluation is compiled and submitted to the US FDA by RIDEM DMF using results from water and air temperature, salinity, harvesting data and literature review.

Vibrio prevention, in the form of shellfish time-temperature regulation, is coordinated by RIDEM DMF and RIDOH and, in the case of aquaculture operations, CRMC. RIDEM DMF is responsible for the wild harvest rules and regulations (250-RICR-90-00-4), and for aquaculture harvesting rules and regulations (250-RICR-40-00-1) and RIDOH is responsible for the dealer handling rules and regulations (216-RICR-50-10-6). A memorandum of agreement (MOA) has been established between RIDEM and CRMC in which the responsibility for physical inspection and operational plan compliance review of aquaculture sites have been assigned to CRMC. A copy of this MOA is included in this document as Appendix B.

RIDEM OWR plays a limited role within the current *Vibrio* control plan. Shellfish program staff attend national and regional conferences and training events, remain current with and participate in discussions regarding proposals presented to the ISSC for incorporation into the NSSP Model Ordinance language and facilitate the exchange of information between the various parties responsible for the implementation of the control plan. The *Vibrio* control plan requires strict time-temperature control of harvested shellfish to minimize *Vibrio* risk. RI's *Vibrio* control plan is available at: <https://rules.sos.ri.gov/regulations/part/250-90-00-4>.

7. Sanitary Surveys

The sanitary survey demonstrates which shellfish growing areas are of acceptable sanitary water quality. This is a critical control point for maintaining the sanitary control of shellfish and protecting public health. The completion of a sanitary survey is of paramount importance in making the distinction between acceptable and unacceptable areas for shellfish harvest. A sanitary survey of each growing area must be made prior to its approval by the OWR shellfish authority as a source of shellfish for direct consumption or a relaying operation. For conditionally approved waters, the sanitary survey will be conducted during periods when the growing area is in the open status. Sanitary surveys are updated for each growing area annually and more thorough updates are completed for each area triennially (every three (3) years). Comprehensive shoreline surveys are completed for each area every twelve (12) years, as further described below:

Annually – The annual sanitary shoreline survey requires a written annual update, field review of any changes in actual pollution sources that have potential to impact the water quality of a growing area, and the analytical results of the routine bacteriological sampling of the growing area.

Triennially - The triennial reevaluation sanitary shoreline survey requires a written report that addresses all pollution sources identified in a growing area. This includes all newly identified, and all previously identified actual or potential sources. The effect of the sources on the growing area are evaluated and documented. As in the annual sanitary shoreline survey the analytical results of routine bacteriological

monitoring are also summarized and evaluated.

Twelve year – The comprehensive twelve-year sanitary survey requires a complete re-evaluation and revision of previous sanitary shoreline surveys, to include waters of all classifications within the growing area. A detailed description of the survey requirements is provided in a subsequent section.

A. Minimum Requirements for Shoreline Surveys in Shellfish Growing Areas

i. Survey Assignment

Each survey area is determined and assigned by the RIDEM OWR Shellfish Growing Area Monitoring Program. Each survey area is identified by a unique designation. All survey data is identified by this designation thus allowing for tracking of all data developed in the survey. All shoreline survey data is documented and filed promptly.

ii. Compilation of Water Quality and Pollution Source Data

Prior to conducting the shoreline survey field work, all routine bacteriological monitoring data collected by the Shellfish Program, and other water quality pollution source data and information available from “non-shellfish program” sources are compiled and summarized. Data sources include the Total Maximum Daily Load (TMDL) program, RIDOH Beach Monitoring Program; volunteer monitoring program(s) and any stormwater outfall monitoring data. Additionally, sewered and unsewered areas are mapped, and the Office of Compliance and Inspection complaint reports and wastewater treatment facility/ pump station by-pass and performance reports in the growing area watershed are reviewed. The above-mentioned data sources are used to identify potential areas of concern to be examined during the shoreline survey.

iii. Examination of Individual Properties for Pollution Sources (performed only as warranted for annual and triennial surveys)

- a. The boundaries of the shoreline survey area are determined by an in-field investigation of the area’s topography and the proximity of individual properties to the growing area - identifying only those properties with the potential to impact growing area water quality and those properties that may be connected hydrologically to sources to the growing area. Once the boundaries of the shoreline survey have been determined, all businesses and residences are examined and all potential discharges of wastes (raw sewage; kitchen, laundry, or agricultural wastes, etc.) are documented using GPS and digital photography. Source water samples are collected, and flow measurement made as required.
- b. The location of each property having a pollution source adversely impacting the growing area is provided.
- c. If the property has a pollution source that has the potential to adversely impact a growing area, one (1) of the two (2) notations listed below is made concerning its impact on water quality.

Direct Impact: A pollution source having direct impact is defined as any waste discharge, which has immediate impact on the growing area. In determining whether a source is direct, it must be apparent that the pollution source is discharging directly into the growing area. Understanding the origin of waste and type of discharge (e.g. storm water outfall or lawn irrigation drain) is important in making this determination.

- An attempt should be made to quantify the volume of the discharge.

Indirect Impact: A pollution source having an indirect impact is defined as any waste discharge, which reaches the growing area in a roundabout way. To classify a pollution source as indirect the surveyor must refer to local maps to help determine possible upstream sources that are contaminating the growing waters through a secondary route of transport (e.g. rivers or streams). Pollution from these sources reach the growing waters through a secondary route, for example, an upland freshwater stream carrying waste or polluted groundwater.

- An attempt should be made to quantify the volume of the discharge.
- d. All sanitary, industrial, or agricultural pollution sources along the shoreline are located on a map of the survey area.
 - e. All animal farms are evaluated. Evaluation shall include the number and type of animals.
 - f. All marinas are evaluated. Marinas and mooring areas should correspond to their established closure zone or so called “Marina Proper”. The number and type of vessels, the availability of pump out facilities, and the number of transient vessels should also be observed and recorded. A complete evaluation of existing marinas and the required dilution calculations for shellfish waters adjacent to those marinas within Rhode Island’s shellfish growing areas has been completed. This document entitled “Evaluation of Waters Adjacent to Marinas: Marina Dilution Analysis Background June 2017” (RIDEM, 2017; and the 2021 update of this document) is maintained in the program’s permanent files.
 - g. Notations are made of any flocks of waterfowl and an estimation of their number given. Populations of wild animals such as deer and muskrat should be noted and where possible an estimation of their number given.
 - h. Drainage ditches are evaluated:
 - Visual observation
 - Sampling/flow rates
 - Other available information collected by watersheds/TMDL group
 - i. Any other potential source of pollution, including but not limited to land uses that may have the potential to contribute poisonous or deleterious substances to a growing area which in the surveyor’s opinion might influence water quality, is noted.
 - j. Photos of actual or potential sources (examples, below) are taken in accordance with the SOP for Digital Photograph Record Collection and Storage (Appendix C)

Examples of potential and actual pollution sources

Photos of two *potential* pollution sources are shown in Figure 1. Example one (Figure 1, left) is of a drainage basin from an outfall pipe, which is pooling on the beach next to shellfish growing waters and has the potential to drain across the beach with additional runoff during wet weather. The second example (Figure 1, right) is of a drainage pipe with no flow at the time of the survey, however during a rainfall event this source may have flow draining directly into the shellfish growing waters.



Figure 1: Examples of potential pollution sources.

Two examples of *actual* pollution sources. The first example (Figure 2, left) are two storm water outfall pipes draining directly into the receiving waters. The second example (Figure 2, right) is from an upland freshwater stream that is draining directly into shellfish growing waters.



Figure 2: Examples of actual pollution sources.

iv. Shoreline Survey Write-up

At the end of each shoreline survey the surveyor writes a summation. The surveyor provides a comprehensive map of the survey area identifying the location of each pollution source found.

The following template outlines the minimum requirements of the Sanitary Survey Report:

- 1.0 Acronyms and Terms
- 2.0 Introduction
- 3.0 Description of the Growing Area
 - 3.1 Location
 - 3.2 Description of the Area
 - Physical Description
 - Latest Survey
 - Previous Classification Maps
 - Current Classification Maps
- 4.0 Pollution Source Survey
 - 4.1 Personnel
 - 4.2 Survey Procedures
 - 4.3 Summary of Sources and Locations
 - Locations of Major Sources
 - Pollution Source Table
 - 4.4 Identification and Evaluation of Pollution Sources
 - Domestic Wastes
 - Stormwater
 - Marinas
 - Agricultural Waste
 - Wildlife
 - Industrial Wastes
- 5.0 Hydrographic and Meteorological Characteristics
 - 5.1 Tides
 - 5.2 Rainfall
 - 5.3 Winds/ Climate
 - 5.4 River Discharges
 - 5.5 Summary
- 6.0 Water Quality Studies
 - 6.1 RIDEM Shellfish Program Monitoring
 - 6.2 RIDEM TMDL Studies
- 7.0 Interpretation of Data
 - 7.1 Effects of Meteorological and Hydrographic Conditions
 - 7.2 Legal Description
 - 7.3 Recommendations
 - 7.4 Conclusions
- 8.0 References

B. Benchmarks for Follow-up Actions

DEM - OWR has developed the following benchmarks to guide source and in-water sampling conducted as part of routine shoreline surveys. The benchmarks will be used in the determination of necessary follow-up actions for any source sample result having fecal coliform >240 CFU and more than trickle flow:

- a. Determine the need for follow-up sampling with consideration to the flow rate, evaluation of sanitary condition of the source (evidence of sewage) and the surrounding land use activities, results of the closest ambient water quality sampling station, and the classification, volume and flushing rate of the receiving waters.
- b. Follow-up sampling will include examination and re-sampling of the source, flow rate of source, and two (2) in-water samples collected within a 150-foot radius of the source or at locations at a minimum depth of 2.5 feet.
- c. If a source represents an immediate threat to the growing area, follow-up sampling and reclassification of the growing waters will be completed as soon as is practical.
- d. At a minimum, sample results >240 cfu/100 ml will be sampled during the triennial survey
- e. At a minimum, sample results >2,400 cfu/100 ml will be sampled during the annual survey
- f. At a minimum, any source sample result $\geq 2,400$ cfu/100 ml and greater than trickle flow shall trigger follow-up sampling and be referred to the Office of Compliance and Inspection for investigation.
- g. Any source sample result ≥ 240 cfu/100 ml and greater than trickle flow in dry weather shall be referred to the OWR RIPDES Program and the MS4 operator for priority in implementation of the six minimum measures by municipalities under the Phase II Stormwater Management Plans.
- h. Reclassification of the area sampled may be required if additional sampling verifies the growing area waters are found to be in an unsanitary condition, i.e., sampling results exceed the mTEC value of 31 cfu/100 ml (MPN value of 49) and/or the presence of any sources that may indicate an immediate threat to human health from the consumption of shellfish harvested from the area.
- i. Field data shall be recorded on standard forms. Examples of a shoreline survey field data sheet (Table 3) and a marina evaluation field data sheet (Table 4) are below.

Table 3: Field data collection sheet used during shoreline surveys.

Shoreline Survey For: Shoreline Survey Page: _____ Date: _____
 _____ of _____ Tide/Weather: _____

Source #	Latitude 41°	Longitude 71°	Description and Location	Actual / Potential	Direct / Indirect	Results	Flow (<u> </u> / s)	Source Dimensions (Width or Diameter x Stage)	Collection Time	Picture #

Comments: _____

Table 4: Field data sheet for marina evaluation

Shoreline Survey For: _____
Ponds 12yr. Sanitary Shoreline Survey

Page: _____

Date: _____

Marina Survey

__ of __

Tide/Weather: _____

Marina Name	Address / Location (Latitude / Longitude)	Approx. # of slips	Approx. # of boats with MSDs (Marine Sanitation Device)	Pump out facility?		Painting or Boat Repair Facility	Sanitary Facilities	
				YES	NO		Yes	No
				Fixed	Mobile	Yes	Sewered	OWTS
				Any visual issues? Current Inspection? Comments on condition of facilities.		Comments on condition of facility.	Any visual issues? Comments on condition of facilities.	

Comments: _____

8. Annual Review of Bacteriological Data

A. Classification Evaluation

An annual statistical evaluation of the routine bacteriological monitoring data is performed to determine whether the state's shellfish growing areas are appropriately classified and in compliance with NSSP standards. Along with a review of shoreline survey results, the results of the routine bacteriological monitoring are used to evaluate the suitability of each growing areas' classification. The information is put in the form of an annual report that includes the results of the bacteriological monitoring of each sample station in each growing area and recommendations as to the classification of the growing area. A shellfish growing area classification map with description of shellfishing prohibited areas, termed the annual "Notice of Polluted Shellfish Grounds" is then produced in May of each year.

A notice announcing the annual publication of the Notice of Polluted Shellfish Grounds is published in the Legal Section of the Providence Journal once a year (typically the week prior to Memorial Day weekend) as required by RI General Law 20-8.1-3, Investigation of Shellfish Grounds – Notice of Polluted Areas. The legal notice refers to the entire "Notice of Polluted Shellfish Grounds" document and its availability on RIDEM's website. The document and corresponding shellfish classification maps are also handed out to commercial shell fishermen with their annual license as well as recreational harvesters on request.

B. Shoreline Survey Results

As described previously, water quality and pollution source data and information available from "non-shellfish program" sources are compiled and summarized. Data sources include the TMDL program, Department of Health's Beach Monitoring Program and volunteer monitoring program(s) and any storm water outfall monitoring data. Onsite Wastewater Treatment System (OWTS) complaints are checked every one-to-two weeks on the Plover database by the authority and a site visit is conducted where necessary for complaints received for sites in the vicinity of shellfish waters. A description of the OWTS issue is added to the growing area shoreline survey files to track the progress of the complaint during the annual growing area shoreline survey follow-ups.

All of the non-shellfish program data are fully evaluated and appropriate follow-up sampling and/or modifications to the Shellfish Program are taken to address potential problem areas – including for example, the addition of routine monitoring stations to more effectively evaluate pollution sources or closure of areas determined to be impacted by pollution sources.

In instances where the Shellfish Program's routine bacteriological monitoring indicate compliance with the standards and "non-shellfish program" data collected at or in close proximity to one of these Shellfish Program stations indicate exceedance of the standards, the following protocol applies:

- i. Confirm that collection and analyses of the "non-shellfish program" samples have followed proper quality assurance protocol.
- ii. As part of the shoreline survey, closely examine the area to identify any potential sources causing fecal coliform elevations.
- iii. For "non-shellfish program" water quality samples having fecal coliform concentrations > 14 cfu/100 ml and < 31 cfu/100 ml, collect water quality samples at both the non-shellfish program sampling station and the Shellfish Program routine bacteriological sampling station.
- iv. For "non-shellfish program" water quality samples having fecal coliform concentrations > 31 cfu/100 ml, collect water quality samples at both the non-

shellfish program sampling station and the Shellfish Program routine bacteriological sampling station; and may collect shellfish from the area to analyze meats for fecal coliform concentration.

Non shellfish program data are not used for calculation of growing area compliance statistics or as a direct comparison to Shellfish Program data. These external data sources are collected at different locations and time periods than the Shellfish Programs sampling regime which may prevent direct comparison. However, these ancillary data provide additional information which may be used for growing area evaluation.

9. Closures and Closure Procedures

A. Conditional Area Rainfall / Precipitation Closures

The RI shellfish program operates several areas as conditionally approved, with precipitation events effecting the harvestability status. The precipitation triggers associated with closure of each conditional area listed in Tables 5 and 6, below.

The precipitation that initiates shellfishing closures can be in the form of rain and/or snowmelt. Precipitation totals are based on the total accumulation during any consecutive twenty-four (24)-hour period (24-hour total). Rain gauge readings of ‘T’ (for trace amount recorded) will be entered as 0.01” for calculation of rain totals. Closures must be implemented within twelve (12) hours of achieving the trigger precipitation amount. The duration of shellfish closures must account for rainfall that falls after the start of each closure and consecutive, overlapping closures may be required for long duration rain storms. An example rain closure scenario for Upper Narragansett Bay, Greenwich Bay and Mt. Hope Bay conditional areas (GA1A, GA8, GA16, GA5 and GA17) is below. A similar process is applied to all conditional areas.

EXAMPLE:

A large, slow moving storm system passes through our area beginning at night. By early morning we have received 0.50” of rain at all the rain stations. At this point it is necessary to initiate a closure of Greenwich Bay, Lower Providence River Area E, Mt. Hope Bay and the Kickemuit River for seven (7) days, beginning at noon that day, and ending seven (7) full days later. It continues raining all day, and by the next morning we have received a total of 1.25” rain in 24-hours. This leads to a closure of Area “1A” for seven (7) days beginning at noon that day. More than 0.5” of additional rain fell after the initial noon closure so it is necessary to extend the Providence River Area E, Greenwich Bay and the Mt. Hope / Kickemuit River closures by one day beginning at noon on the second day of the rain storm. This storm event scenario would result in Providence River Area E, Greenwich Bay, Mt Hope Bay and the Kickemuit River being closed for eight (8) consecutive days spanning two overlapping 7-day closures, while Area “1A” would be closed for seven consecutive days spanning one closure.

Table 5: Precipitation Closure amounts and closure duration for Narragansett Bay conditional areas.

AREA	RAIN GAUGE LOCATION	0 – 0.49"	0.50" to 1.19"	1.2" - 2.99"	>3.0"
GA 1 - Upper Narragansett Bay Area "A"	TF Green NOAA KPVD NBC – Fields Point NBC – D.O.T.	Open	Open	7 day closure	10 day closure
GA16 Lower Providence River Cond. Area	T. F. Green NOAA KPVD	Open	7 day closure	7 day closure	10 day closure
GA 8 - Greenwich	T. F. Green NOAA KPVD	Open	7 day closure	7 day closure	7 day closure
GA 17 - Mt. Hope Bay GA 5 - Kickemuit River	Taunton – NOAA KTAN	Open	7 day closure	7 day closure	7 day closure

Table 6: Precipitation Closure amounts and closure duration for Pt. Judith Pond conditional areas.

AREA	RAIN GAUGE LOCATION	0 – 1.4"	1.4" – 3"	>3" to 5.5"	> 5.5"
GA 10 – Pt Judith Pond Conditional Area	Westerly Airport (NOAA KWST).	Open	7 day closure	7 day closure	Closed until further notice
GA 10 – Pt Judith Pond	Westerly Airport (NOAA KWST).	Open	Open	7 day closure	Closed until further notice
GA 10 – Potter Pond	Westerly Airport (NOAA KWST).	Open	Open	7 day closure	Closed until further notice

B. Back-to-back Rainfall

Rain closure of RI conditionally approved shellfish areas is based on total rainfall received in a 24-hour period. There is a possibility that multiple rain storms may have a cumulative negative impact on the microbial water quality of a growing area that is not accounted for in the 7-day closure applied to a single rain event. Out of an abundance of caution, RIDEM Shellfish staff analyzed available weather and fecal coliform data for the 2014 to 2020 period to document the impacts of ‘back-to-back’ rain storms on the microbial water quality of shellfish conditional areas.

Given the relatively rare occurrence of back-to-back storms exceeding rainfall closure thresholds and because the fecal coliform data of interest must be collected 1-8 days following the end of the last rain event, back-to-back rain data were limited. The back-to-back rain analysis documented fecal coliform abundance and time to recovery to acceptable water quality following fourteen back-to-back storms in conditional area (GA1 = 3 events; GA8 = 4 events; GA5&17 = 6 events; GA10 = 1 event). Available data showed that conditional areas return to acceptable levels of fecal coliform abundance within five days after the initiation of the last overlapping conditional rainfall closure. This analysis provided documentation that the rainfall -triggered closure period of 7-days is of sufficient duration following back-to-back storms to allow water column fecal coliform levels to return to background levels prior to the growing area being returned to the open status. Therefore, additional ‘back-to-back’ storm conditional criteria are not required for these conditionally approved areas. This analysis is summarized in the document ”Back-to-back Precipitation Analysis for Shellfish Conditional Areas ” on file in the Program’s permanent files.]

C. Conditional Area Waste Water Treatment Facility (WWTF) Closures

Currently the RI shellfish program operates several conditional areas that include continued attainment of WWTF performance standards as part of the conditional area management plan. Conditional areas that include WWTF performance criteria include Lower Providence River Conditional Area E (GA16), Upper Narragansett Bay (GA1 – Area A), Greenwich Bay (GA8) and Mt Hope Bay (GA17). As described in each area’s Conditional Area Management Plans, these areas will be closed to shellfish harvest if there is an upset in WWTF operation that could negatively impact the microbial water quality of the growing area. The Conditional Area WWTF closure criteria are summarized below:

Table 7: WWTF-related closure criteria for RI shellfish conditional areas.

Area Name	Growing Area ID	Shellfish Classification	Conditional Management Closure Criteria	Reopening Criteria
Lower Providence River Conditional Area E	GA16	Conditionally Approved	Loss of treatment at Fields Point, Bucklin Point or East Providence WWTF – Emergency Closure	Return of WWTF to normal operation; water samples to demonstrate acceptable microbial water quality plus two additional days shellfish cleansing time.
Upper Narragansett Bay	GA1	Conditionally Approved	GA1: Loss of treatment at Fields Point, Bucklin Point, or East Providence or Warren WWTF – Emergency Closure Portion of GA1 from Rumstick Point north to GA2: Loss of Disinfection at flows >0.75 MGD from the Warren WWTF	Return of WWTF to normal operation; water samples to demonstrate acceptable microbial water quality plus two additional days shellfish cleansing time.
Greenwich Bay	GA8	Conditionally Approved	Loss of treatment at East Greenwich WWTF such that effluent exceeds 20,000 cfu/100 ml	21 days after return of WWTF to normal operation; <i>or</i> shellfish meat samples collected 7-days or later after event end with MSC results of less than 50 pfu/100 grams or a predetermined background level
Mt. Hope Bay	GA17	Conditionally Approved	Fall River WWTF bypass of greater than 6 million gallons in a 24-hour period	7 days after end of bypass event

D. Seasonally Approved Area Closures

The Rhode Island shellfish program operates several areas as seasonally approved waters; these include seasonal marina closures. These marinas and adjacent waters are closed in the summer months (closed Saturday prior to Memorial Day through the Tuesday following Columbus Day) when anchorages or mooring fields are being used by boats. Seasonal marina closures occur in portions of growing areas 3, 4, 5, 7, 10, 11NG, 11QW, 13, and 14E. Refer to Appendix E for maps showing seasonally approved areas.

E. Emergency Closures and Emergency Excessive Rain Closures

Emergency shellfish closures are not routine and are in response to unpredictable events, that may degrade the water quality of a shellfish growing area. The need for emergency closures may also

become evident through the review of monitoring data collected after extreme rain events. Unusually large rainstorms may require an emergency closure.

Emergency rain closures are infrequent (approximately once per year or less frequently) and occur only after extreme weather events such as hurricanes or intense storms. An analysis of extreme rainfall and fecal coliform data was completed to derive appropriate emergency rainfall closure thresholds for each shellfish growing area. These analyses are described in the document “Determination of Excess Rain Closures for RI Shellfish Growing Areas” available in the shellfish programs permanent files. A summary of emergency excess rainfall closure thresholds and emergency rain closure duration used in RI shellfish growing areas are listed in Table 8. If emergency rain closure precipitation amounts are exceeded, the growing area will be placed in the closed status within 12-hours of the rainfall amount reaching the closure threshold as described below (section 9F, Closure Initiation).

Table 8 (next page): Emergency closure rain amounts and emergency rain closure duration times for RI shellfish growing areas. Rain gauge used to determine closure rainfall in 24-hour period is listed (KPVD is NWS (National Weather Service) gauge at TF Green Airport; NBC is gauge at Narragansett Bay Commission; KTAN is NWS gauge at Taunton Airport; KWST is NWS gauge at Westerly Airport; KBID is NWS gauge at Block Island Airport).

Growing Area	Classification	Rain Gauge	Emergency Closure rain trigger and duration
1A Upper Bay	Conditionally Approved	KPVD	1.2" to 3" rain, 7-day closure
	< 1.2" rain, Open	or NBC	3" to 6" rain, 10-day closure
			>6" rain, closed until further notice
1B Upper Bay	Approved	KPVD	3" to 6" rain, 10-day closure
		or NBC	>6" rain, closed until further notice
3 East Middle Bay	Approved	KPVD	3" to 6" rain, 7-day closure
			6" to 9" rain, 10-day closure
			>9" rain, closed until further notice
4 Sakonnet	Approved	KPVD	8" to 9" rain, 7-day closure
			>9", closed until further notice
5 Kickemuit	Conditionally Approved	KTAN	0.5" to 4" rain, 7-day closure
	<0.5" rain, Open		>4" rain, closed until further notice
6 East Passage	Approved	KPVD	8" to 9" rain, 7-day closure
			>9", closed until further notice
7 West Passage	Approved	KPVD	6" to 8" rain, 7-day closure
			>8" rain, closed until further notice
8 Greenwich Bay	Conditionally Approved	KPVD	0.5" to 6" rain, 7-day closure
	<0.5" rain, Open	KPVD	>6", closed until further notice
9 West Middle Bay	Approved	KPVD	3" to 6" rain, 7-day closure
			6" to 9" rain, 10-day closure
			>9" rain, closed until further notice
10PJ Pt. Judith Pond	Conditionally Approved	KWST	1.4" to 5.5" rain, 7-day closure (Upper Pond Cond Area)
	<1.4" rain, Open		>5.5" rain, closed until further notice
	Approved	KWST	3" to 5.5" rain, 7-day closure
10PT Potter Pond	Approved	KWST	>5.5", closed until further notice
			3" to 5.5" rain, 7-day closure
11NG Ninigret & Green Hill Pond	Approved	KWST	>5.5", closed until further notice
			3" to 5.5" rain, 7-day closure
11Quon Pond	Approved	KWST	>5.5" rain, closed until further notice
			3" to 5.5" rain, 7-day closure
11Winn Winnapaug Pond	Approved	KWST	>5.5" rain, closed until further notice
			3" to 5.5" rain, 7-day closure
13 Great Salt Pond BI	Approved	KBID	>5.5" rain, closed until further notice
			3" to 9" rain, 7-day closure
14 Offshore	Approved (remote)	n/a	No excess rain emergency closure
16 Lower Providence River E	Conditionally Approved	KPVD or NBC	3" to 6" rain, 10-day closure
	<0.5" rain, Open		>6" rain, closed until further notice
17 Mt. Hope Bay	Conditionally Approved	KTAN	0.5" to 4" rain, 7-day closure
	<0.5" rain, Open		>4", closed until further notice

F. Closure Initiation

i. Routine Precipitation – Conditional Area Closures

Precipitation that may initiate shellfish closures can happen any time of the day or any day of the week. During working hours, shellfish program staff are responsible for monitoring on-going rain or snow melt events. The assigned staff person is typically the person who will be on-call for the up-coming weekend coverage, which rotates between three staffers on a tri-weekly basis. Staff are required to frequently access the web sites for NOAA / NWS weather stations (Providence, Theodore Francis Green State Airport (KPVD); Taunton, Taunton Municipal Airport (KTAN); Westerly Airport (KWST)) and remain in contact with NBC (Narragansett Bay Commission) via email to track precipitation totals. A decision on closures will be made by approximately 9:00 am for a noon time closure and by approximately 4:00 pm for a sunrise next day closure. During these working hours, any of these appropriate rain stations will be used to determine a closure event. WWTF staff and DEM Division of Law Enforcement staff notify DEM Shellfish staff of any WWTF treatment upsets or sewage spills directly through an email alert system (described below). The electronic WWTF and spill reports provide time of discharge start and stop, total discharge amount, and type of discharge so that DEM Shellfish staff (available on call 7-days per week) can respond if a shellfish area closure is necessary.

The assigned on-duty shellfish program staff person will discuss any unusual conditions directly with the Supervising Scientist or other appropriate staff person within the Office of Water Resources as described in the shellfish closure checklist (Appendix A). Examples of these unusual events include pump station overflows, a power failure and loss of treatment at a WWTF, a loss of disinfection at a WWTF or severe existing or predicted weather conditions such as hurricanes or flooding.

As part of OWR's management of conditional areas, weekend and holiday coverage is required. All wastewater treatment facilities are required to immediately report any WWTF process failures such as loss of disinfection through an email alert system. The email alert system notifies DEM OWR Shellfish staff of spill and treatment plant process failures electronically (email) 24 hours a day, 7 days a week. On weekends and holidays the shellfish program staff person on weekend/holiday coverage checks for email alerts and precipitation totals twice per day (approximately 0730 in the morning and 1530 in the afternoon) at the following weather stations:

- TF Green Airport (KPVD, Warwick, RI) for GA1, GA16, GA8 rain closures
- Taunton (MA) Municipal Airport (KTAN) for GA5 & GA17 rain closures
- Westerly RI Airport (KWST) for GA10 rain closures

When rain amounts exceed the closure criteria of conditionally approved shellfish growing areas, a harvesting closure is initiated. These closures are based on the management plan that has been developed for each area. The weekend on call WWTF status and precipitation checks at 0730 and 1530 allow sufficient time to implement a closure within 12 hours of a WWTF upset or rainfall total reaching a closure trigger. Shellfish staff use a Department-issued iPad or laptop computer to complete the twice-daily weekend and holiday precipitation and WWTF check-ins for conditional areas.

ii. Emergency Closures

Emergency shellfish closures are not routine and are in response to unpredictable events, such as extreme rainfall, harmful algae blooms, flooding, hurricanes, oil spills, discharge of treated or un-treated sanitary waste that may have an immediate effect on the water quality of shellfish growing areas. An emergency closure may be triggered by any unpredicted pollution event that may threaten the quality of shellfish making them unsafe or potentially unsafe for human consumption. The need for emergency closures may also become evident through the periodic review of monitoring data collected after extreme rain events. See Table 8 for a listing of emergency excess rain closure thresholds and closure durations for RI shellfish growing areas.

In addition to the more widespread events mentioned above, smaller, localized events such as a sanitary sewer overflow (SSO) may also necessitate an emergency closure of shellfish waters. During normal working hours notification of SSO and similar events are received from the WWTF *via* email. WWTF facilities' Rhode Island Pollution Elimination Discharge Permit (RIPDES) require that the facilities notify DEM O&M (Operations and Maintenance) staff immediately in the event of an SSO or other disruption in plant operation. Protocols are in place such that O&M staff immediately convey this information to Shellfish Program staff in writing *via* email. All information related to the SSO that is available such as location, estimated volumes, start and stop times, pollution abatement efforts and any other pertinent information shall be included in said notification as it is relayed to shellfish staff. Shellfish staff shall review and determine the impacts of the SSO on shellfish waters using best professional judgement with protecting public health as a priority. Based on available information, status of the event and historic events similar in location or quantity, shellfish staff shall determine the need to institute an emergency closure of shellfish waters. Records of these types of events, along with related sampling results and closure documents are maintained in the program's permanent files. Press releases announcing emergency closures are posted to local media outlets, the Department's web page and its social media pages. Depending upon the location (approved waters) and the magnitude or duration of the SSO, additional notice to the industry *via* telephone and or email and posting to the RI Marine Fisheries and RI DEM Shellfish listserv may also be warranted. The RIDOH food protection division is also included in the notification, as would regional or federal officials should the event warrant such notification.

During non-working hours notification of an event is transmitted by the facility to RIDEM through an email alert system. Shellfish staff on call during weekends and holidays will at a minimum be made aware of such an event at the time of the morning (0730) or afternoon (1530) email and weather check and will respond accordingly to the event.

When it is determined necessary to enact an emergency closure, the program supervisor shall notify the Administrator of the Office of Water Resources through the appropriate chain of command. If that cannot be accomplished, the program supervisor shall notify the Director's Office, first trying to notify the Associate Director and if necessary, the Director. Under no circumstances should this information be conveyed to someone in a message format.

If an emergency closure is the result of a sanitary sewer overflow from a municipal sewage system, the area is placed in the closed status for either 1) a minimum of 21 days following the end of the event 2) the return of bacteria MSC coliphage results to background levels as demonstrated by samples collected at least seven days following the end of the event (NSSP Model Ordinance Section II, Chapter IV @02 E).

10. Cooperative Efforts

The Rhode Island Shellfish Program relies upon a coordinated effort between multiple departments and state agencies to comply with all aspects of the NSSP Model Ordinance. Maintaining up to date Memorandums of Understanding (MOUs) is an on-going task. The following are a brief description and list of responsibilities associated with the current MOUs relative to shellfish harvesting activities.

A. NSSP Shared Responsibilities

The NSSP requires (Chapter 1 @01 D) an inter-agency agreement describing NSSP-related responsibilities of each agency comprising the state shellfish control authority. An MOU describing the responsibilities of the RI DEM and RI DOH in enacting requirement of the NSSP was established in 1978 and is in the process of being updated in 2023.

B. Marine Biotxin Monitoring Program

As described in Section 5, RIDEM OWR is responsible for the collection of phytoplankton water samples; RIDOH Water Microbiology Laboratory is responsible for the identification and enumeration of potentially toxic phytoplankton organisms; and as relevant, RIDEM DMF may be required to collect shellfish to be analyzed by RIDOH. RIDOH will notify RIDEM OWR immediately when any condition(s) of the monitoring plan triggers are met. Impacted areas will be closed to the harvesting of shellfish as necessary according to the Harmful Algal Bloom and Shellfish Biotxin Monitoring and Contingency Plan (RIDEM, 2021).

B. Shellfish Controlled Relay

The state of Rhode Island allows only controlled relay of shellstock. This relay is coordinated and conducted by RIDEM DMF along with RIDEM DLE and industry partners. DMF also coordinates with OWR and RIDOH before a controlled shellfish transplant can take place. The OWR reviews the status of the area proposed for relay and confirms the water quality classification and status of the appropriate sanitary survey meets the restricted classification to allow a controlled relay. Representative samples of shellfish are collected prior to determining the suitability of shellstock for controlled relay from the area and the RIDOH does a baseline shellfish meat analysis. The current MOU was updated in 2020. .

C. Aquaculture

The Rhode Island Coastal Resource Management Council (CRMC) is the lead agency overseeing aquaculture operations in Rhode Island waters. The CRMC works cooperatively with RIDEM OWR, RIDEM DMF, RIDEM DLE and RIDOH to ensure compliance with the sections of the model ordinance applicable to the harvest of farmed shellfish. The memorandum of agreement for inspection of aquaculture facilities by CRMC is included in Appendix B.

D. Consistency with NSSP Model Ordinance

The requirements of the National Shellfish Sanitation Program may change, requiring changes in the duties of the respective departments tasked to ensure compliance. It is recommended that the information in this Standard Operating Procedure (SOP) be reviewed and updated on a regular basis to assure consistency with the evolving NSSP “Guide for the Control of Molluscan Shellfish” Model Ordinance.

E. Boats

To monitor the state’s shellfish waters, the RI DEM OWR shellfish program operates and maintains

several trailer-able boats to carry out the various monitoring efforts across state waters. The following is a brief description of each vessel:

The primary sampling vessel is a model year 1999 23-foot Pilothouse Ocean Scout powered by a model year 2022 150 HP outboard motor. This boat is designated for monitoring use in deeper bay waters and is not suitable for sampling in shallow coastal ponds. It is equipped with dual batteries and has two (2), twelve (12)-volt DC plug connectors for lap top computers, Garmin chart plotter, or other related monitoring equipment. It has a one hundred (100)-gallon gas tank and is equipped to run at night. This boat has a trailer and should be towed by OWR's, Ford F-150 truck. This vessel is currently docked in a commercial marina located in the town of Barrington and is readily available year-round for routine sampling of Narragansett Bay.

The program also maintains a 16-foot aluminum Jon boat (model year 1999) powered by a model year 2005 25 HP Yamaha outboard motor. This boat can be operated in shallow water to about one and a half (1.5) feet of water. The recommended work areas for this boat are the coastal shore ponds, Warren and Barrington Rivers, etc. This boat has a trailer and is stored primarily at the DMF facility in Jerusalem to enable more efficient monitoring of the coastal salt ponds. The Jon boat is also used to ferry staff to remote locations for shoreline surveys.

Vessels operated by other Divisions within the Department occasionally assist OWR with monitoring of shellfish waters. For example, the Division of Law Enforcement brings OWR staff to the coastal waters of GA14 for fecal coliform and HAB monitoring of these offshore waters. Also, the Division of Marine Fisheries assists in the collection of plankton samples during HAB phytoplankton blooms.

Appendix A: Conditionally Approved Growing Area Closure Checklist

Conditional Area Closure Checklist Date: _____ Prepared by: _____ Date Signed: _____							
<ul style="list-style-type: none"> <input type="checkbox"/> Closure A Conditional Area "A" (1.2" TFG or NBC D.O.T or NBC F. Pt.) <input type="checkbox"/> Closure E Providence River (0.5" TFG or NBC D.O.T or NBC F. Pt.) <input type="checkbox"/> Closure D Greenwich Bay (0.5" TFG) <input type="checkbox"/> Closure H Kickemuit River and Mt. Hope Bay (0.5" Taunton) <input type="checkbox"/> Closure J Pt. Judith Pond (1.4" Westerly) <input type="checkbox"/> Emergency Closure Mouth of Warren River (Warren WWTF emergency) <input type="checkbox"/> Emergency Closure Narragansett Bay, from South Prudence, north including the Kickemuit River and Mt. Hope Bay <input type="checkbox"/> Emergency Closure all waters of the state 	<ul style="list-style-type: none"> <input type="checkbox"/> <u>Update website</u> <input type="checkbox"/> <u>Update email listserv</u> <input type="checkbox"/> <u>Update Shellfish Hotline</u> <input type="checkbox"/> <u>Call Enforcement 222-2284, 222-3070, 222-3071</u> <input type="checkbox"/> <u>Complete affidavit and legal docs</u> <input type="checkbox"/> <u>Check Recording</u> <input type="checkbox"/> <u>Change dates on boards</u> <p>Give reason for closure of conditional areas (include dates of rain / other events): _____</p> <p>Comments: _____</p>						
Record WWTF bypass amounts below: Bucklin Pt NDS: _____ Bucklin Pt WWF: _____ Fields Pt: _____ Other: _____							
	Upper Narragansett Bay Area "A"	Providence River		Greenwich Bay	Mt. Hope Bay Kickemuit River	Pt Judith Pond	Other: _____
Closure #							
Amount of Rainfall (Snow Melt) at onset of closure	TFG _____	NBC _____	TFG _____	NBC _____	_____	_____	_____
Total Event Rainfall	_____	_____	_____	_____	_____	_____	_____
Start of Closure	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise
1st Day of closure	_____	_____	_____	_____	_____	_____	_____
Last day of closure	_____	_____	_____	_____	_____	_____	_____
End of closure	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise	<input type="radio"/> Noon <input type="radio"/> Sunrise
Duration	_____	_____	_____	_____	_____	_____	_____

Appendix B: Memorandum of Agreement RIDEM and CRMC Aquaculture Inspections

MEMORANDUM OF AGREEMENT

Department of
Environmental
Management
Coastal
Resources
Management
Council

Concerning the inspection of aquaculture farms for the purpose of
ensuring food safety, public health, and enforcement of RIDEM's
Aquaculture of Marine Species in Rhode Island Waters

Summary

This Memorandum of Agreement has been developed by Department of Environmental Management (hereinafter the "RIDEM") and the Coastal Resources Management Council (hereinafter the "CRMC") for the purpose of coordinating each agency's roles related to ensuring public health through the inspection of the facilities of licensed aquaculturists who produce cultured shellfish. The RIDEM and CRMC have each been vested with certain statutory authority in different but related areas concerning the production of cultured shellfish products. The production of these shellfish products is regulated, *inter alia*, pursuant to the authority of regulations captioned *Aquaculture of Marine Species in Rhode Island Waters*. RIDEM amended these regulations to address the risk of food-borne illnesses related to the consumption of raw or undercooked cultured shellfish. The amendment of *Aquaculture of Marine Species in Rhode Island Waters* was recently promulgated and became effective on July 1, 2014. The main goal of *Aquaculture of Marine Species in Rhode Island Waters* is to ensure that the production and handling of cultured shellfish is accomplished in a manner that results in a safe product. Ensuring the safety of this product will not only benefit the consumers of the product but will also benefit the aquaculturists who produce this product through assurances that their product has been raised consistent with high industry standards for safety and that compliance with *Aquaculture of Marine Species in Rhode Island Waters* will help to ensure that their product can reach market. Aquaculture is a segment of agriculture that has shown remarkable growth and has considerable potential for further growth. However, RIDEM has limited capacity to conduct regular inspections of aquaculture facilities to ensure that cultured shellfish are being farmed and harvested in compliance with *Aquaculture of Marine Species in Rhode Island Waters*; CRMC would appear to have the requisite resource capacity to satisfy this responsibility.

Need

Aquaculture is a segment of agriculture that has experienced significant growth and that growth rate is expected to sustain. Cultured shellfish produced by aquaculture farmers is generally a safe and wholesome agricultural product. Recently, federal and state public health and

environmental officials have been tracking food-borne illnesses related to the consumption of raw or undercooked shellfish. These illnesses have been related to the presence of several species of bacteria that occur naturally in coastal waters. These species of bacteria generally occur in warmer weather. Cultured shellfish that is harvested at times of the year when these bacteria are at high levels can present a public health risk unless precautions are taken to mitigate that risk. *Aquaculture of Marine Species in Rhode Island Waters* was amended to provide regulations that all aquaculturists must follow to ensure that their product remains safe and wholesome even when water temperature is conducive to the presence of unsafe levels of potential disease producing bacteria. This Memorandum of Agreement is intended to clearly define the roles and responsibilities of the two primary state agencies with authority over aquaculture with the goal of ensuring the safety of cultured shellfish and sustainability of aquaculture through effective enforcement of *Aquaculture of Marine Species in Rhode Island Waters*.

Risk

There are two primary risks: the risk to public health; and the risk to industry. The risk to public health is illness caused from the consumption of shellfish that may harbor unsafe levels of harmful bacteria. Consumption of this product can be a risk to public health unless certain precautions are taken. The risk to industry is less obvious. RI aquaculturists are free to market their product interstate as long as their product is deemed safe by the Federal Food and Drug Administration (FDA). These interstate markets may be closed to RI Aquaculturists if illness related to the consumption of cultured shellfish exceeds thresholds that have been set by the FDA or if the FDA determines that state agencies have insufficient oversight of the industry. Therefore, the public, the aquaculture industry, and the commercial harvesters of wild shellfish stock all have a vested interest in the safety of cultured shellfish products. The assurance of that safety is met through enforcement of *Aquaculture of Marine Species in Rhode Island Waters* and the safeguards therein.

Current Situation

Aquaculture of Marine Species in Rhode Island Waters has been promulgated and is in force. Pursuant to those regulations, RIDEM and CRMC have roles in the siting, licensing, and operation of aquaculture farms. Pursuant to Rule 7 of *Aquaculture of Marine Species in Rhode Island Waters*, the authority of the elements of inspection and enforcement a-re vested with RIDEM. RIDEM has limited resources for routine inspections of aquaculture facilities. CRMC conducts inspections of aquaculture facilities on a regular basis. These inspections are primarily to ensure that the operational plans, as submitted by the aquaculturist as a permit requirement, are being followed. Additionally, *Aquaculture of Marine Species in Rhode Island Waters* has been amended to address the handling of harvested cultured shellfish to mitigate the risk of food-borne illness. This amendment has increased the scope of elements that are subject to inspection by mandating that harvested shellfish have

adequate temperature controls in place to mitigate the risk of food-borne illness related to bacteria.

Whereas RIDEM has the authority to conduct inspections to ensure safety of harvested product, CRMC conducts inspections of aquaculture farms on a more frequent basis. Vesting CRMC with the authority to conduct inspections will be beneficial to RIDEM, to CRMC, to the industry (by meeting inspection standards set by FDA to ensure food safety) and most importantly, to the public.

Modification of Current Situation

Pursuant to **RIGL § 20-10-12, Permits and licenses for the taking, possession, sale, importation, and transportation of species used in aquaculture** - The DEM director will recognize the CRMC aquaculture permit as satisfying the requirement for a permit issued by the director to take, possess, import or transport animal or plant species utilized in aquaculture. A DEM license, renewed annually, will still be required by individual aquaculturists to sell shellfish to a licensed RI dealer.

Pursuant to **RIGL § 20-10-15, Authority to enter and inspect.** - "The director [of DEM] shall have the authority to enter and inspect any and all areas subject to an aquaculture permit for the purpose of determining compliance with the terms and provisions of the permit." RIDEM Director will delegate inspectors from CRMC with the authority to conduct inspections of aquaculture operations for the purpose of ensuring food safety by enforcement of *Aquaculture of Marine Species in Rhode Island Waters*.

The annual aquaculture lease site inspection and operation plan review completed by the CRMC Aquaculture Coordinator will satisfy the inspection requirement pursuant to DEM *Aquaculture of Marine Species in Rhode Island Waters* and National Shellfish Sanitation Program Model Ordinance Chapter 6.03.A (2011).

Additional inspections will be conducted annually as needed and in consultation between the CRMC Aquaculture Coordinator and DEM.

Role: RIDEM

1. RIDEM will remain the agency with authority to inspect aquaculture farms for compliance with the provisions of *Aquaculture of Marine Species in Rhode Island Waters*, and may conduct inspections to ensure compliance with those provisions at any time.
2. RIDEM will remain the agency with the authority to take punitive action against any licensed aquaculturist that is determined to be in violation of *Aquaculture of Marine Species in Rhode Island Waters*.
3. RIDEM will delegate inspectors from CRMC with authority to conduct inspections of aquaculture farms for compliance with *Aquaculture of Marine Species in Rhode Island Waters*.
4. RIDEM will develop a standardized inspection checklist to be used by inspectors from RIDEM and CRMC.
5. RIDEM will support CRMC staff in any inspection where support is requested.
6. RIDEM will accept any inspection performed by CRMC staff as an official

inspection.

Role: CRMC

1. CRMC will inspect aquaculture farms to the standard that is established consistent with *Aquaculture of Marine Species in Rhode Island Waters*.
2. CRMC will keep record of all inspections performed and provide those records to RIDEM. CRMC will make all inspection forms available by January 15 each year to DEM, or within seven (7) days of a written request to CRMC from DEM. Forms will be either scanned and made into a PDF and emailed to the DEM Director and DEM Division of Agriculture or entered into a database that can be shared between DEM and CRMC.
3. CRMC will use standardized inspection forms as developed and provided by RIDEM.
4. CRMC will support RIDEM staff in any inspection where support is requested.
5. CRMC will conduct a sufficient number of inspections of aquaculture farms to satisfy the requirements of the National Shellfish Sanitation Program Model Ordinance.
6. CRMC shall keep DEM Division of Agriculture and the DEM Director informed in a timely manner as to any violations or concerns regarding leases.
7. CRMC shall immediately inform DEM Division of Law Enforcement regarding any violation of *Aquaculture of Marine Species in Rhode Island Waters* that result in harvest of shellfish in a manner that could jeopardize public health. CRMC inspectors shall, upon request by DEM, remain on site until arrival of an Environmental Police Officer, to ensure that evidence of such violation is not compromised.
8. CRMC shall, upon request by DEM, serve as witness for any administrative or criminal proceedings that result from violations of *Aquaculture of Marine Species in Rhode Island Waters*.

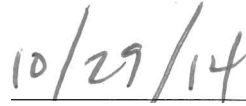
Agreement

RIDEM and CRMC agree to use their best efforts to work together to ensure that the goals and objectives set forth in this Memorandum of Understanding are achieved in order to protect public health and the aquaculture industry.

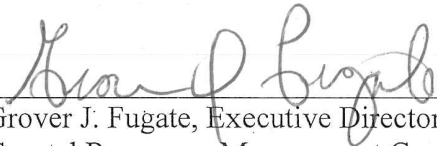
This Memorandum of Understanding will become effective immediately upon signing and will remain in effect until one from its effective date, subject to annual renewal by the parties. Any party may terminate its involvement in this Agreement by providing written notice to other party to the Agreement. Said Party's termination of the Agreement shall be effective a minimum of Thirty (30) days from receipt of written notice by the other Party to the Agreement. IN WITNESS THEREOF the said parties are in agreement and hereto set their hands to duplicate originals of this Memorandum of Understanding.



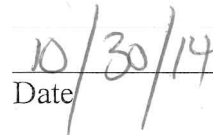
Janet Coit, Director
RI Department of Environmental Management



Date



Grover J. Fugate, Executive Director
Coastal Resources Management Council



Date

Appendix C: Digital Photograph Record Collection and Storage SOP

Digital Photograph Record Collection and Storage SOP
SOP-WR-W-26

1. APPLICABILITY. This SOP applies to the TMDL and Shellfish programs in the Office of Water Resources where staff utilizes digital photography, including but not limited to shoreline surveys, environmental restoration or protection projects or any other photo-documentation purposes. Exemption from the use of this SOP for project work shall be allowed for reasons of inapplicability determined by management discretion. This SOP was adapted from DEM SOP-OD-QM-4. The changes to the SOP relate to the amount of metadata that is needed. Since these programs often take pictures for informational purposes only, it is up to the individual to decide (with their supervisor, if necessary), what level of metadata is needed for each set of photographs taken.

2. PURPOSE. Photography that has a reasonable probability to be considered for use as legal evidence, historic record or other value to the State must be protected from loss or destruction. This SOP provides a method to collect and store digital photographs and associated documentation data. The use of digital photography for documentation has resulted in a proliferation of data files that can be lost or easily destroyed, since unlike traditional printed-paper, they may not physically exist except in the form of magnetic or optically read media. There are many types of digital cameras, photographic processing software and operating systems in use currently at DEM, however certain common elements can be used as a framework to establish a standard method to assist in preservation of these records for easy retrieval and future use.

3. DEFINITIONS

3.1. WWW - World Wide Web

3.2. JPG - is a commonly used image file format for photographic images. JPEG is an acronym for the group that invented the format (Joint Photographic Experts Group)¹. When you create a JPEG or convert an image from another format to a JPEG, you are asked to specify the quality of image you want. Since the highest quality results in the largest file, you can make a trade-off between image quality and file size.

3.3. GIF- Graphic Interchange Format²

3.4. PNG - Image file format supported on the WWW³

3.5. BLUETOOTH - a telecommunications industry specification that describes how cameras, mobile phones, computers, and personal digital assistants (PDAs) can be easily interconnected using a short-range wireless connection.

3.6. THUMBNAIL - A reduced file size version of a photographic record used for indexing and previewing of images.

¹ http://searchwebservices.techtarget.com/sDefinition/0,,sid26_gci212425,00.html

² *ibid.*

³ *ibid* SOP-WR-W-26 Effective Date: 9/01/08 Revision No.0 Last Revision Date: Page 2 of 5

3.7. GPS - The GPS (Global Positioning System) is a "constellation" of 24 well-spaced satellites that orbit the Earth and make it possible for people with ground receivers to pinpoint their geographic location. A basic GPS receiver provides geographic position - longitude and latitude, within 100 meters. Some receivers are equipped with a display screen that shows a map of the position.⁴

3.8. MEDIA - Electronic device that is designed to store or storing electronic records such as magnetic and optical disks, cards containing microchips etc.

4. RESPONSIBILITIES

4.1. COMPLIANCE - All staff engaged in collecting DEM digital photographic records are responsible to determine applicability of this SOP to their work. See Section 1 above. Supervisors are responsible for ensuring that staff is familiar with and adhere to any SOPs affecting their program functions.

5. GUIDELINE AND PROCEDURES

5.1. CAMERA AND FIELD NOTES

5.1.1. Verify that the date and time on the camera is accurate.

5.1.2. Activate the visible date and time option such that the recorded image will be imprinted with the date and time of the photo.

5.1.3. Select appropriate resolution quality. The higher the resolution the fewer the images that can be recorded for a given media.

5.1.4. Descriptive documentation should be recorded in sequentially numbered field notes immediately after the images are collected for specific photograph detail recall. (See 5.5.1)

5.2. COMPUTER SUBDIRECTORIES CREATION AND FILE NAME CONVENTIONS

5.2.1. Create a subdirectory on the computer to store the image files.

(A) File name conventions for subdirectory folders should be established to facilitate organization of records by Project, Station or Location.

(B) Multiple photo documentation sessions at a particular station or location should have date coding in the subdirectory name convention.

(C) Create a print image or report subdirectory to store the print versions of select images.

5.2.2. File name conventions for image files should be established to facilitate organization of records, for example, by: Project, Station or Location, Date, and a unique identifier, if necessary. (i.e. Project_Station_Date_UniqueIdentifier.jpg). An image taken for the Wood River Basin Monitoring Project at Station #2 on 19 August 2006 could be named "WRB_Station2_19AUG2006.jpg". If multiple pictures were taken at this station on this date, each file name should include a unique identifier (e.g. WRB_Station2_19AUG2006_Looking_Downstream.jpg").

Renaming photos may not be needed if it is sufficient to place photos in a directory whose name includes the date the pictures were taken and the location or

⁴http://searchmobilecomputing.techtarget.com/sDefinition/0,,sid40_gci213986,00.html SOP-WR-W-26

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if a report is created that details photo information.

5.3. COMPUTER IMAGE TRANSFER AND THUMBNAIL PRINT

5.3.1. Transfer the image files to the computer by various methods below:

- (A) Connect camera directly to the computer with the supplied cable.
- (B) Remove the memory card from the camera and use a card-reading device connected to the computer.
- (C) Use of Bluetooth or other wireless transfer protocol.

5.3.2. When the device connection is recognized by the computer you will typically be given the option of storage file location and whether to delete the image files after transfer.

- (A) Do not select “delete after transfer” option until you are experienced with successful location and retrieval of your images from a previous photo transfer procedure.
- (B) Select the appropriate subdirectory for transfer of the photos.

5.3.3. Validate the transfer of images to the new directory by viewing the directory and comparing file sizes to originals.

5.3.4. Deleting images from the camera or camera media.

- (A) If you are confident that the transfer was successful, avoid selecting and deleting the camera image processing files and delete only the camera image files with suffixes .jpg, .gif, or .png.

5.3.5. Print out a thumbnail sheet of photographs transferred to the file.

5.4. IMAGE ENHANCEMENT

5.4.1. Typical digital photography processing software enables simple improvement of images with respect to contrast, brightness and level of detail though special effects. If there is reason to believe that the image may be used for legal purposes, then any image-modified versions must not result in the replacement of the original image. Any modified image should be saved as a new file name encoded in a convention that clearly discloses image enhancement.

5.5. CREATE REPORT OR PRINT IMAGE FROM TEMPLATE

5.5.1. The decision to create a report for photographs is based on the use of those photographs. As mentioned in Section 5.2.2, it may be sufficient to place the photographs in a directory containing the project, the date, and the location of the photographs.

5.5.2. Templates for print out of photographic documentation may include:

- (A) Date of photo record.

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- (B) Originating DEM Office.
- (C) Photographer name.
- (D) Other DEM staff witnesses to photograph conditions.
- (E) Image sequence number.
- (F) Location or site of photography, GPS coordinates if available.
- (G) Photo description or caption.

5.5.3. Load the template file and “Save-as” a new report name.

5.5.4. Select the best representative images for print out to a template appropriate in size to the level of detail required and copy them into the

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template.

5.5.5. Fill out section 5.5.1 details in the template from memory and/or field notes.

5.5.6. Print the report and file it with the other project records including the above said thumbnail sheet.

5.6. CREATE DUPLICATE ELECTRONIC RECORD (BACKUP)

5.6.1. To maintain a permanent record and to create an electronic backup of the original photos programs shall adopt some of the mechanisms including but not limited to the following:

- burn a CD of the project work,
- copy to other internal drives,
- emailing them to storage areas,
- use of jump drives.

5.6.2. If available and network storage capacity allows, utilize DEM network to archive image files.

6. REFERENCES

6.1. See Footnotes.

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**DIGITAL PHOTOGRAPH RECORD COLLECTION AND STORAGE SOP
SOP-WR-W-26**

Originator:

Heidi Travers _____ Date: _____

Print Name Signature

APPROVALS:

Quality Team Chair:

Tom Getz _____ Date: _____

Print Name Signature

Assistant Director of Water Resources

Alicia Good _____ Date: _____

Print Name Signature

DISTRIBUTION:

(x) TMDL.....By: _____ Date: _____

(x) Shellfish.....By: _____ Date: _____

Appendix D: HAB Monitoring and Contingency Plan

The RI HAB Monitoring and Contingency Plan is available at (most recent update):
<http://www.dem.ri.gov/programs/benviron/water/shellfish/pdf/habplan.pdf>

Appendix E: Shellfish Growing Area Classification Maps as published May 2023

Current RI shellfish growing area classification maps are available at:
<http://www.dem.ri.gov/maps/mapfile/shellfsh.pdf> .

An online RI shellfish classification map tool is available at:
<http://ridemgis.maps.arcgis.com/apps/webappviewer/index.html?id=110a7a4aec914a3492117e9848fe67da> .

Recent RI shellfish sanitary surveys and classification reports are available at:
<https://dem.ri.gov/environmental-protection-bureau/water-resources/research-monitoring/shellfish-area-monitoring> .