Connecticut's Shellfish Growing Area Program: Adherence to National Standards and Significance for Recreational Programs

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Department of Agriculture, Bureau of Aquaculture

Sea Grant Connecticut

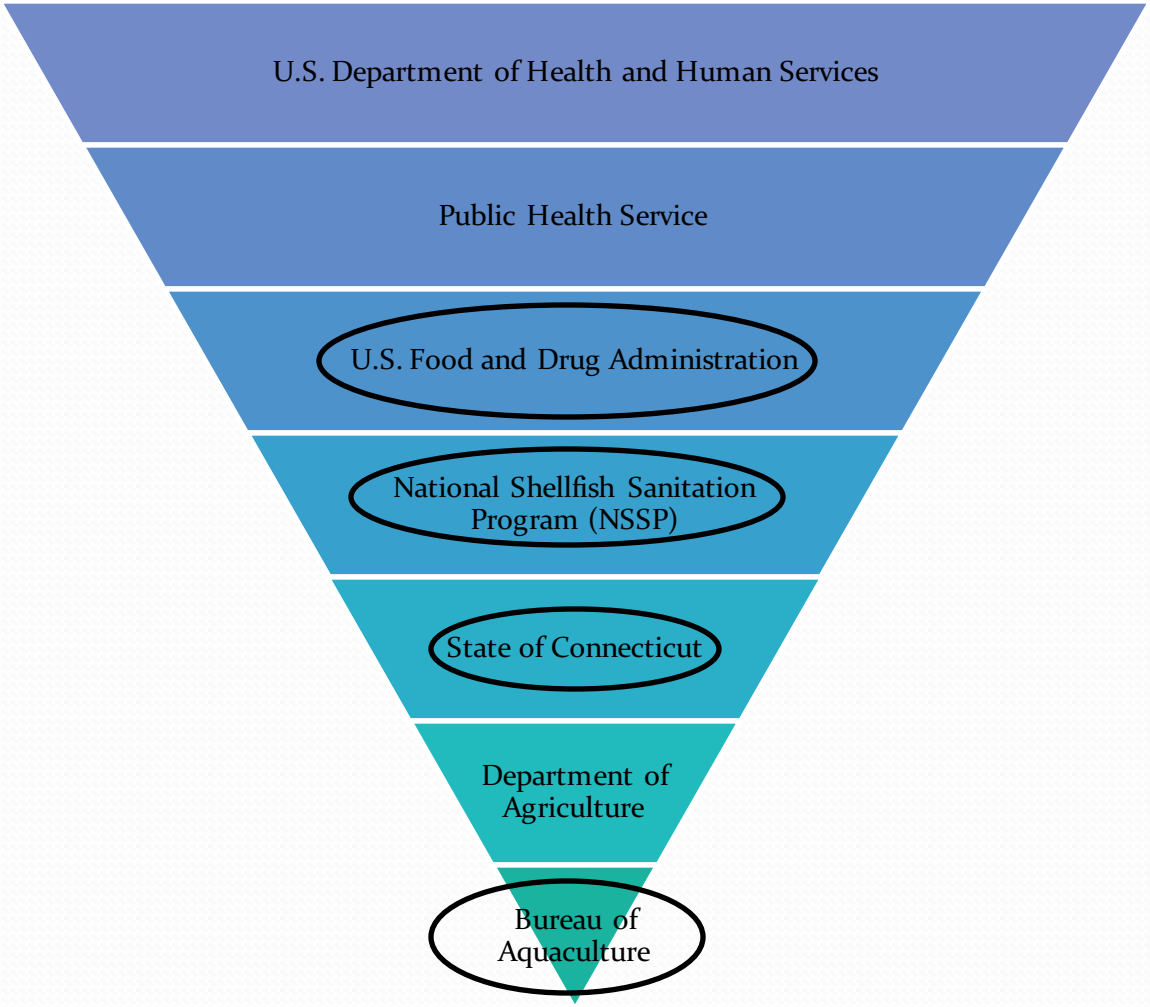
NOAA

The Sound School

Overview

- Who we are
- What we do
- Why we do what we do

Who we are


U.S. Department of Health and Human Services
Public Health Service
U.S. Food and Drug Administration
National Shellfish Sanitation Program (NSSP)
State of Connecticut
Department of Agriculture
Bureau of Aquaculture

DA/BA Staff

Director — David Carey

Shellfish Laboratory — Joseph A. DeCrescenzo, Microbiologist II; Inke Sunila, Fish Pathologist

Shellfish Sanitation Program

- Kristin DeRosia-Banick Environmental Analyst II
- Alissa Dragan, Environmental Analyst II
- Shannon Kelly Analyst II
- Jenifer Yeadon, Environmental Analyst I

Boat Operations — Glen Charland, Research Ship Engineer

What we do

- Implement the NSSP (National Shellfish Sanitation Program) Guide for the Control of Molluscan Shellfish (Model Ordinance)
  - Chapter 1 @1 A-F and @2 A-H

What we do

@.01 Administration.

A. Scope. The Authority shall establish a statewide shellfish safety and sanitation program to regulate:

(1) The classification of shellfish growing areas;

(2) The harvesting of shellfish;

(3) Shellfish processing procedures and facilities;

(4) Product labeling;

(5) Storage, handling and packing;

(6) Shellfish shipment in interstate commerce;

(7) Shellfish dealers; and

(8) Bivalve aquaculture.

B. State Laws and Regulations… provide an adequate legal basis for the safety and sanitary control of all program elements

C. The Authority shall maintain records to demonstrate the effective administration of a statewide shellfish safety and sanitation program.

E. Administrative Procedures. The Authority shall have administrative procedures sufficient to:

(1) Regulate shellfish harvesting, sale, or shipment; and

(2) Ensure that all shellfish shipped in interstate commerce originate from a dealer located within the state from which the shellstock are harvested or landed, unless the Authority has a memorandum of understanding with the Authority in another State to allow dealers from its state to purchase the shellstock.

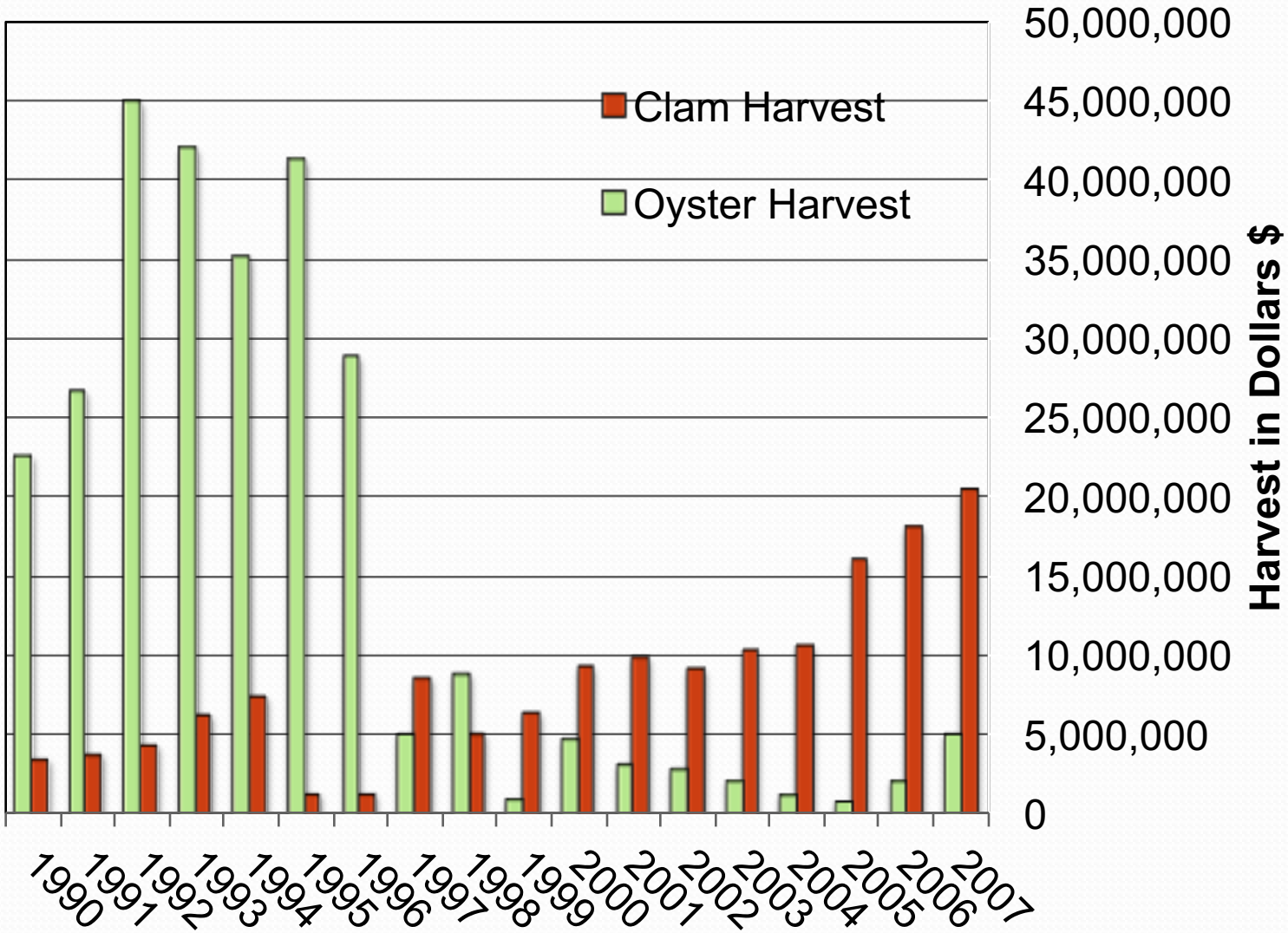
(3) Detain, condemn, seize, and embargo shellfish.

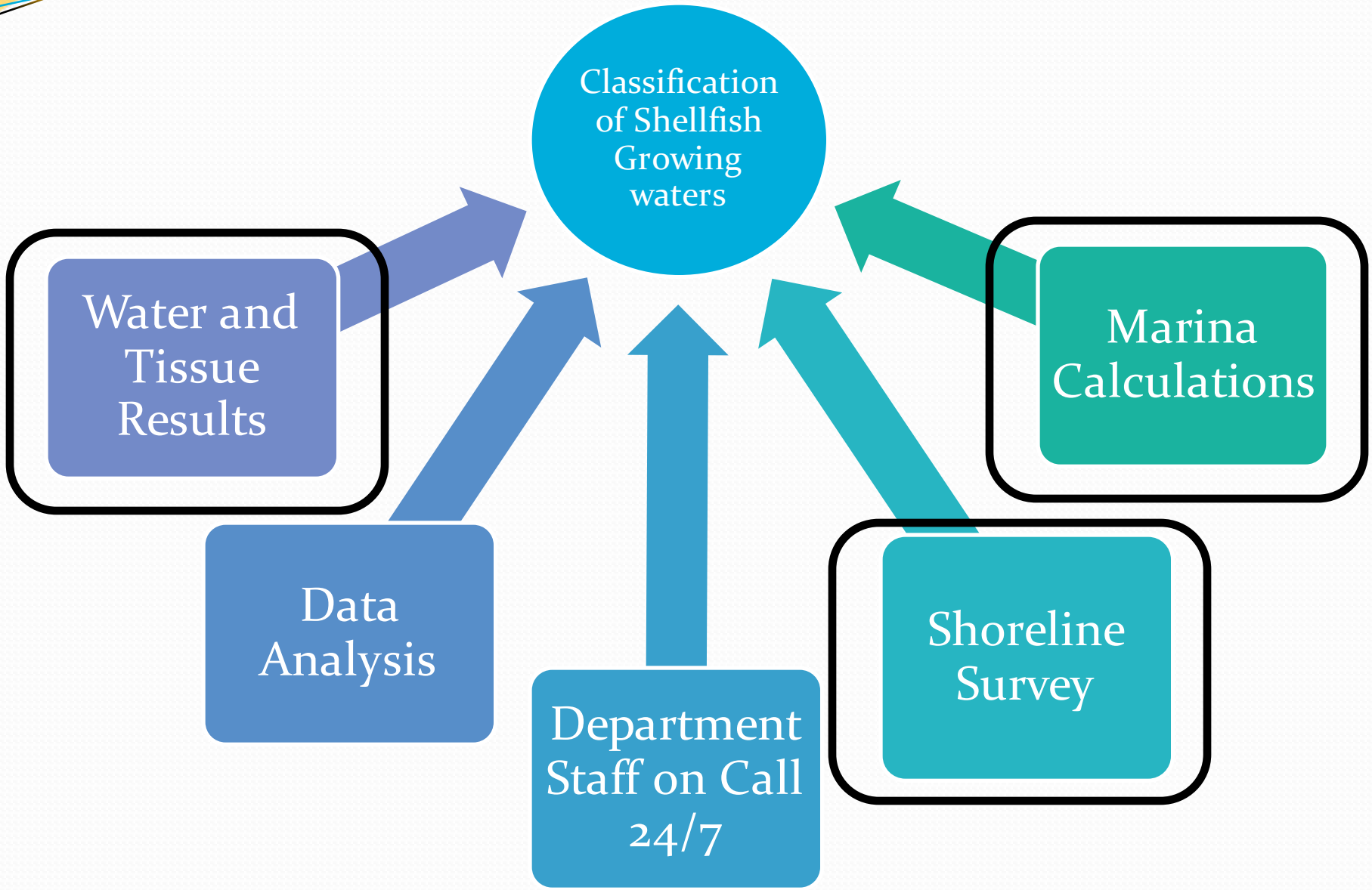
(4) Assure compliance with Shellfish Plant Inspection Standardization.

(5) Epidemiologically Implicated Outbreaks of Shellfish-Related Illness. The Authority shall have procedures for investigating incidents of shellfish borne disease.

@.02 Dealer Certification.

CT Oyster and Clam Landings 1990-2007




Classification of Shellfish Growing waters
Water and Tissue Results
Data Analysis
Department Staff on Call 24/7
Shoreline Survey
Marina Calculations

Sanitary Survey
(per NSSP Model Ordinance)

Written evaluation of all environmental factors, including **actual** and **potential** pollution sources, which have a bearing on the water quality in a shellfish growing area

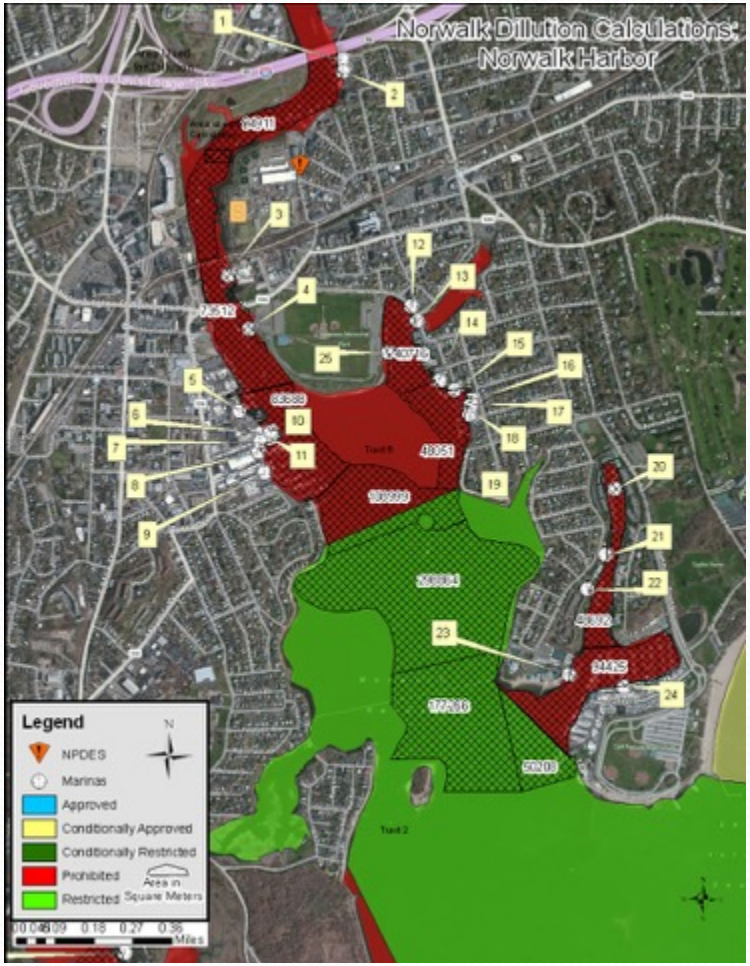
Shoreline of every town in CT is walked and visually inspected for potential and actual sources of pollution every 12 years

Marina surveys are performed to evaluate the potential for contamination by boats discharging waste

Water pollution control facilities, industrial discharges, storm sewers and pump stations are evaluated

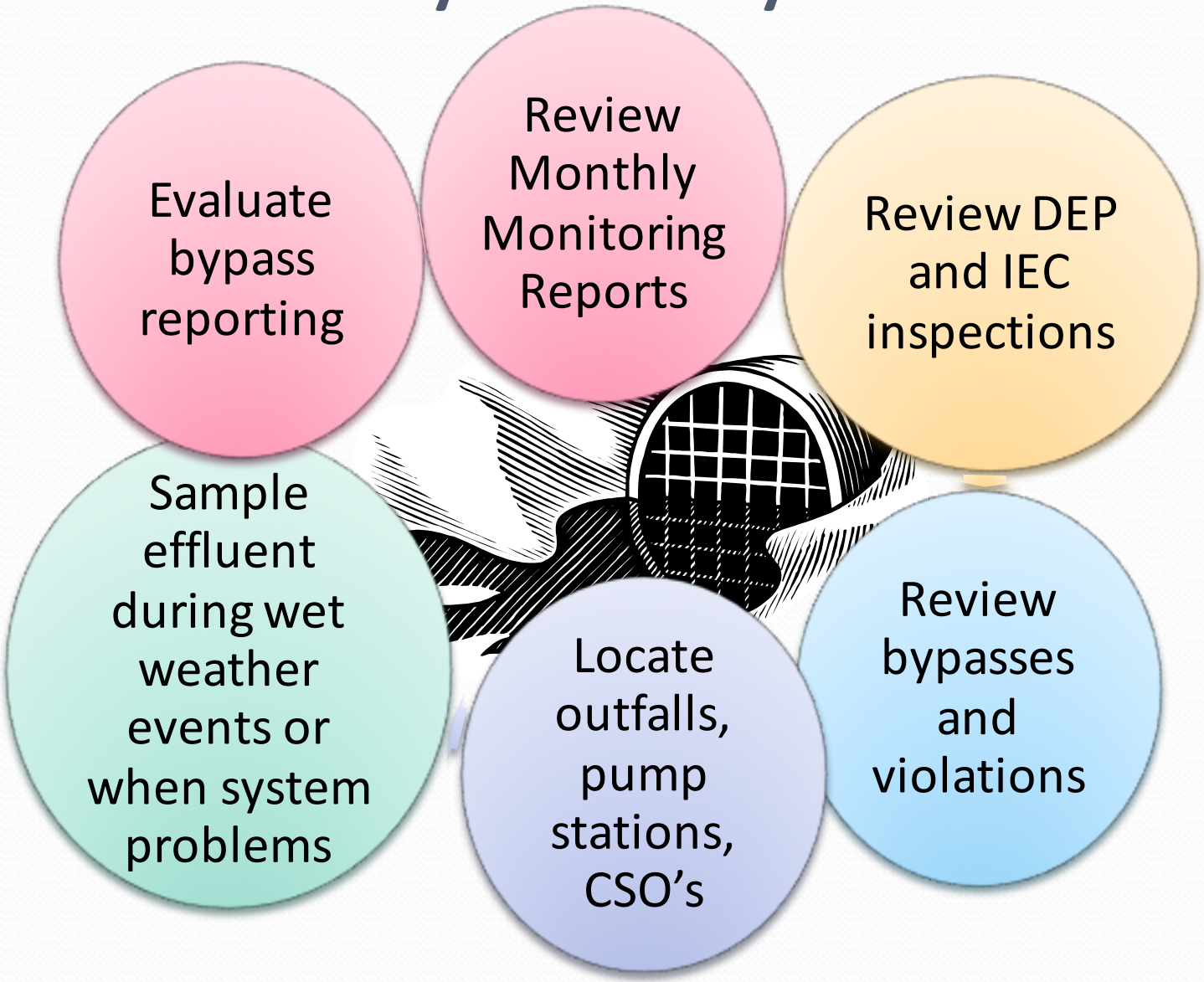
Shoreline Survey Reconnaissance: Individual properties are inspected for signs of failing septic systems and cross connections to stormwater system

Marina Dilution Calculations

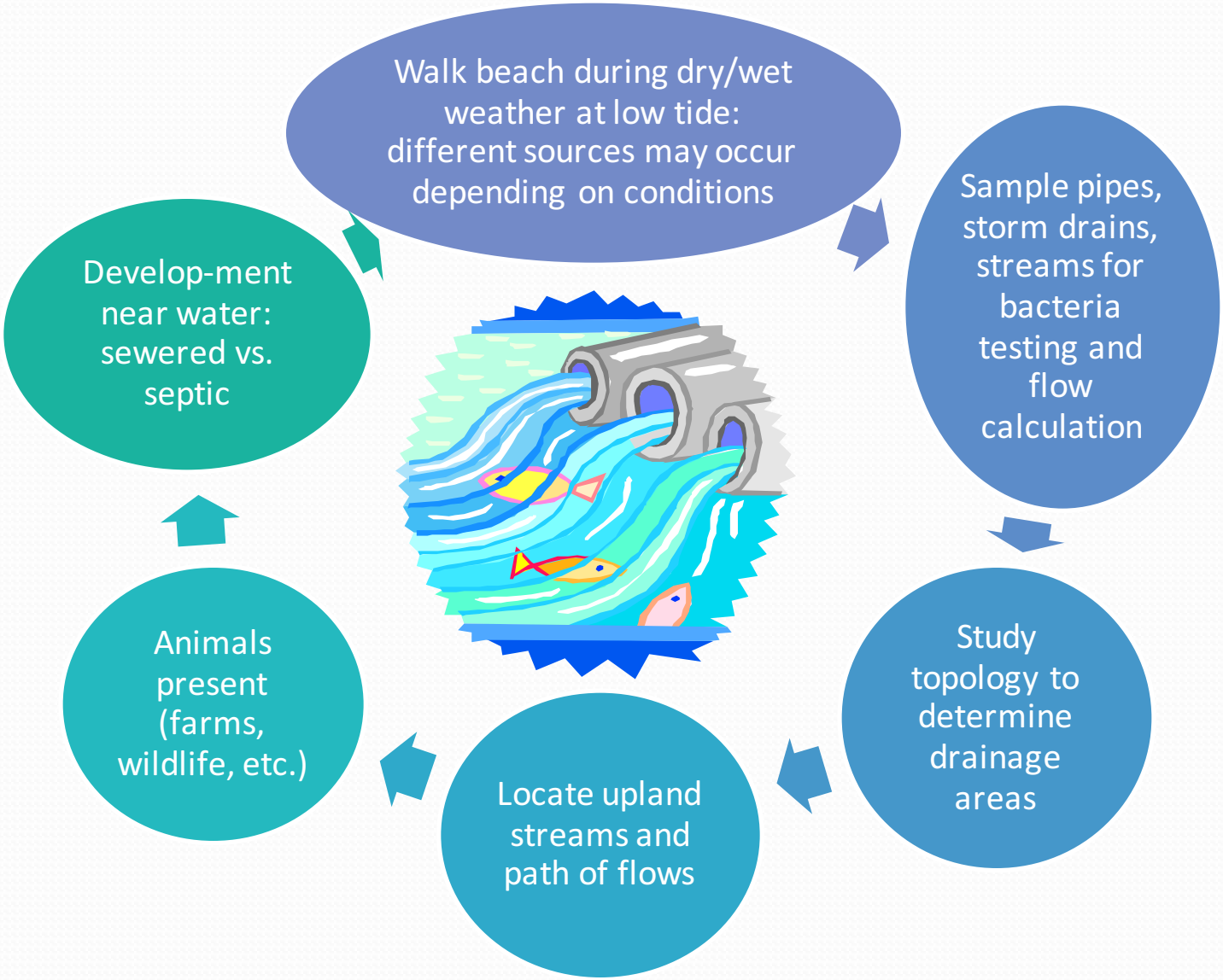


- NSSP Model Ordinance Chapter IV.@.05
- NSSP Model Ordinance Public Health Explanations II.IV.@.05
- FDA Guidelines 1989 Evaluation of marinas by State Shellfish Sanitation Control Officials

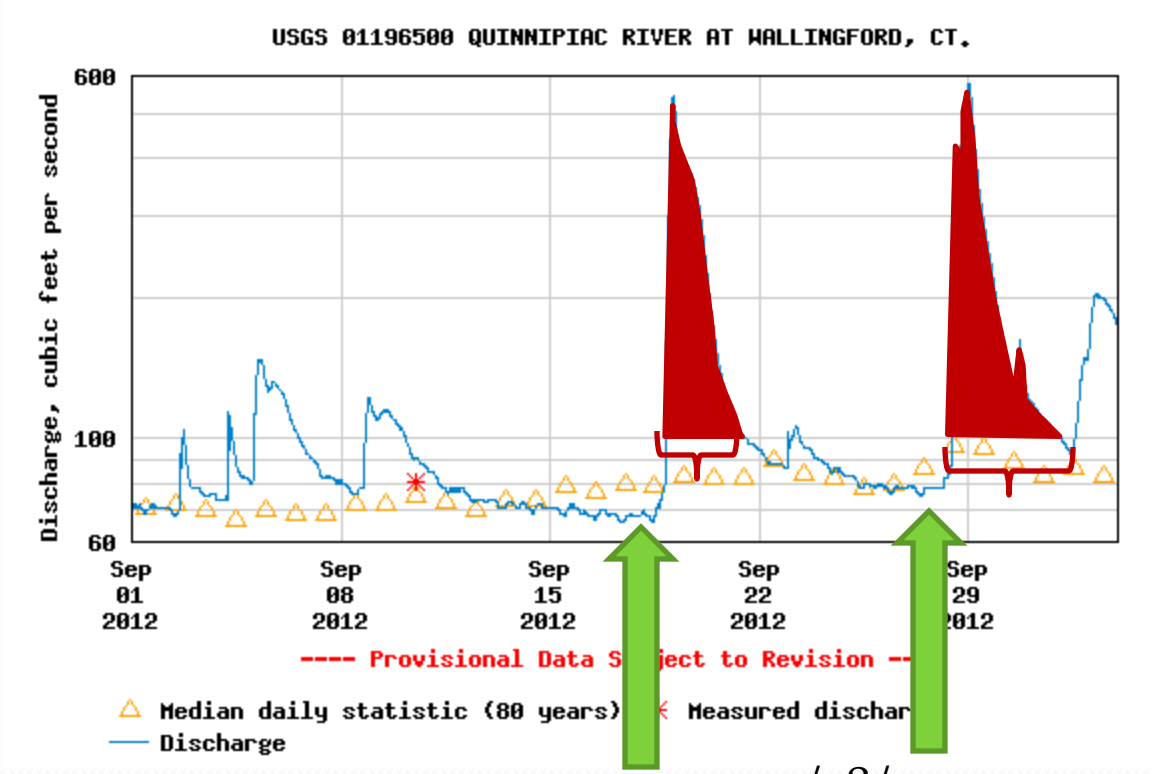
Sanitary Survey:WPCFs



Sanitary Survey: Shoreline Survey Reconnaissance



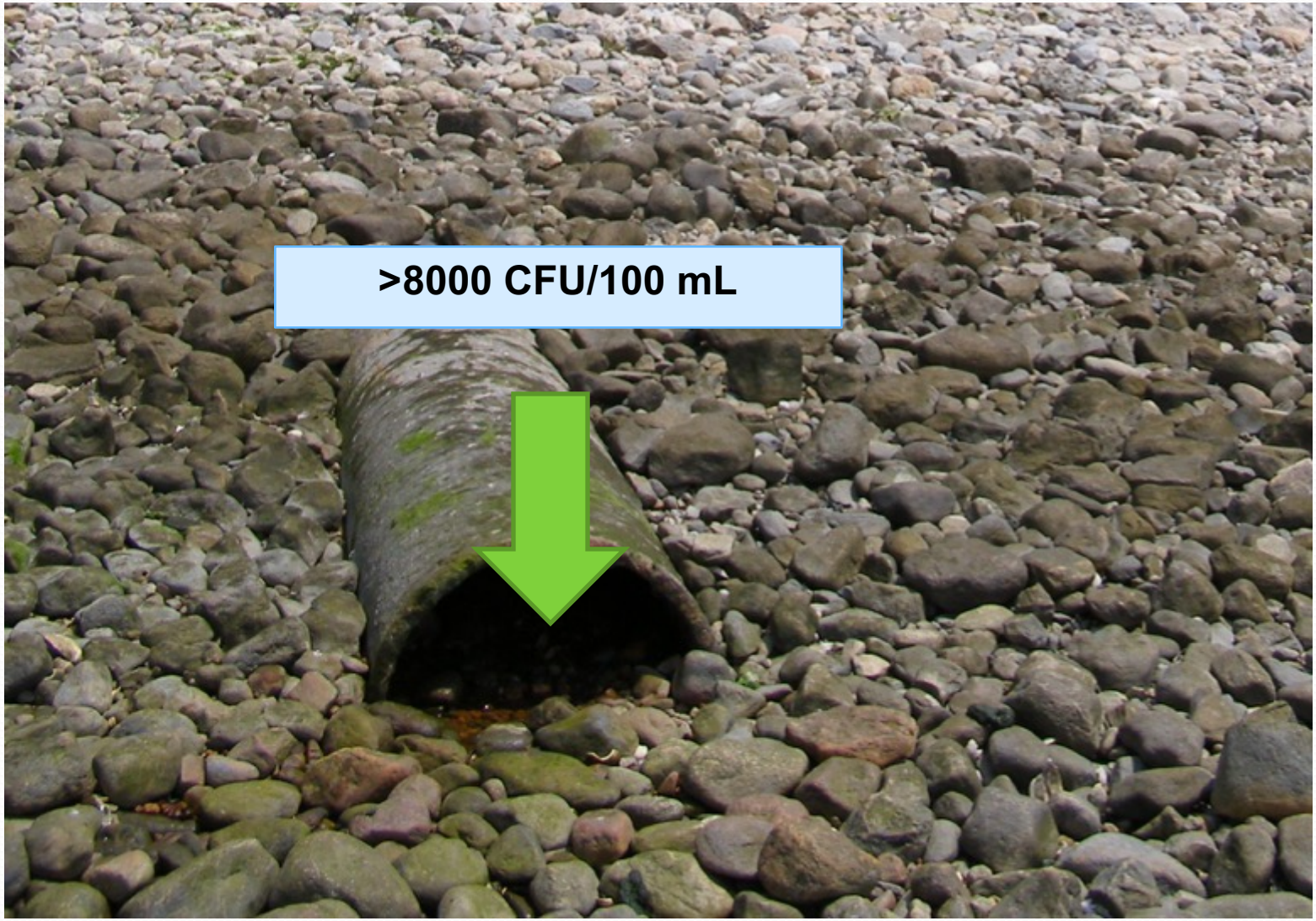
Shoreline Survey: Meteorological influences

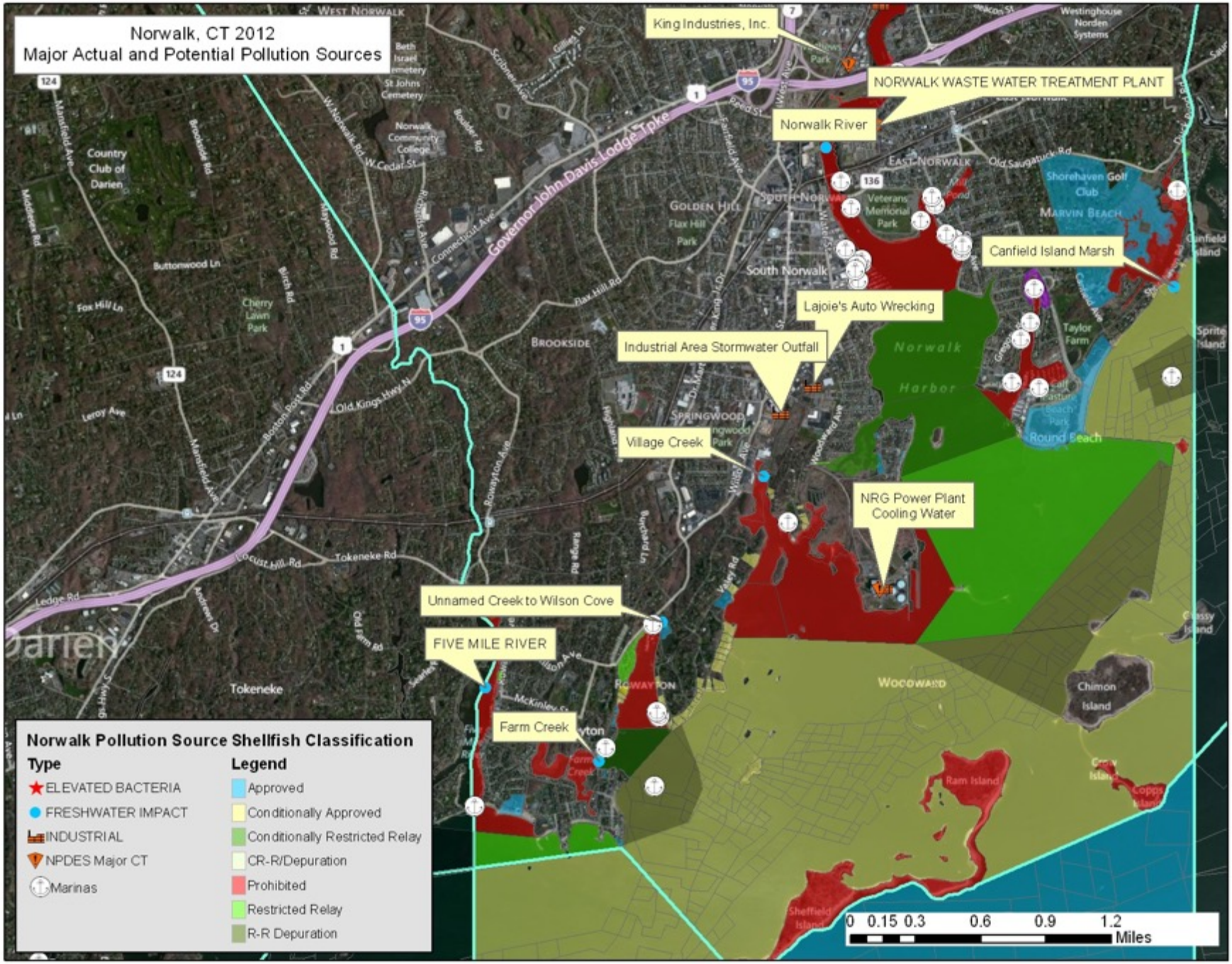


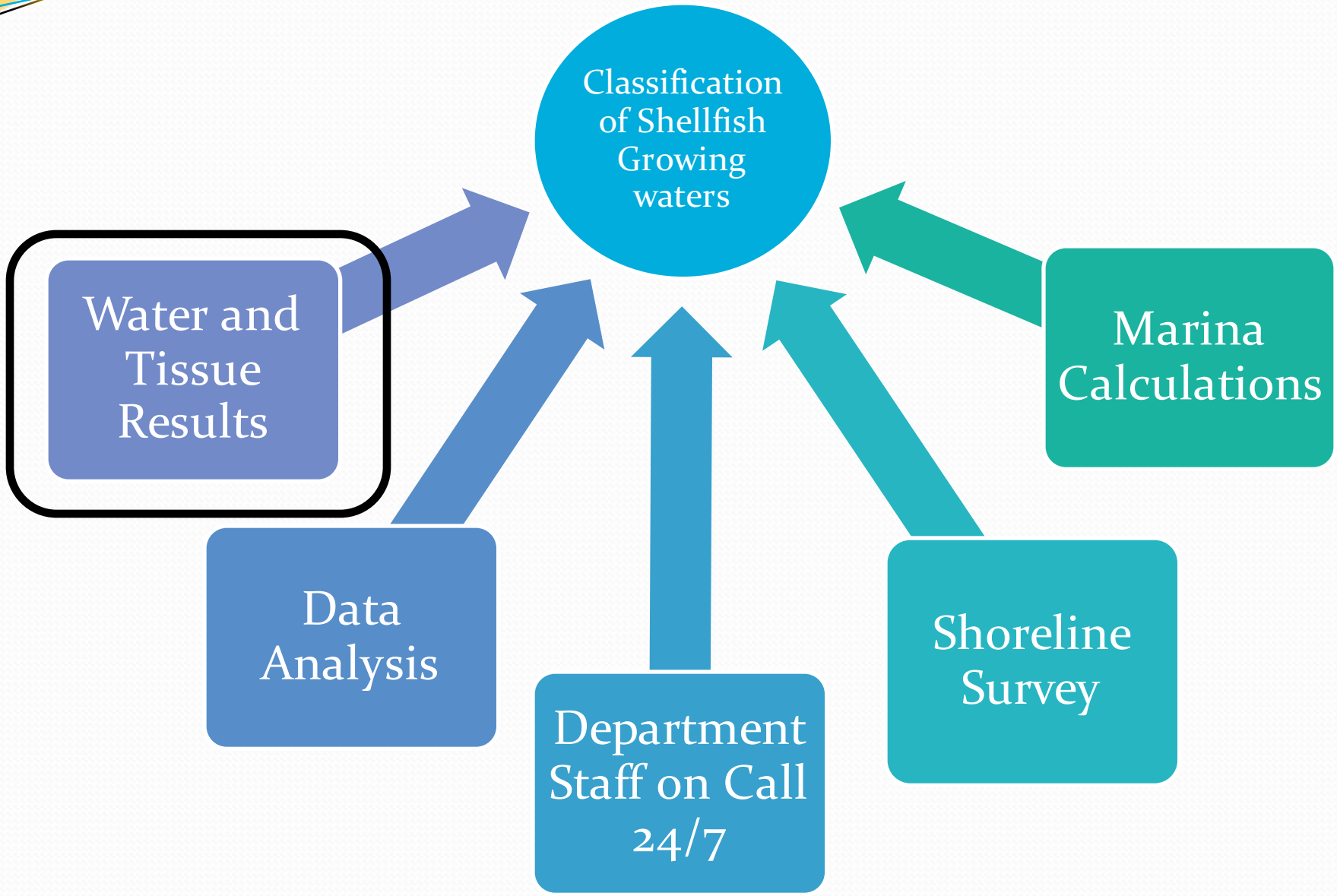
9/19/2012
1.28”

9/28/2012
4.68”

Stormwater Outfalls




Norwalk, CT 2012
Major Actual and Potential Pollution Sources
King Industries, Inc.
NORWALK WASTE WATER TREATMENT PLANT
Norwalk River
Canfield Island Marsh
Lajoie's Auto Wrecking
Industrial Area Stormwater Outfall
Village Creek
NRG Power Plant Cooling Water
Unnamed Creek to Wilson Cove
FIVE MILE RIVER
Farm Creek
Norwalk Pollution Source Shellfish Classification
Type
ELEVATED BACTERIA
FRESHWATER IMPACT
INDUSTRIAL
NPDES Major CT
Marinas
Legend
Approved
Conditionally Approved
Conditionally Restricted Relay
CR-R/Depuration
Prohibited
Restricted Relay
R-R Depuration
0 0.15 0.3 0.6 0.9 1.2
Miles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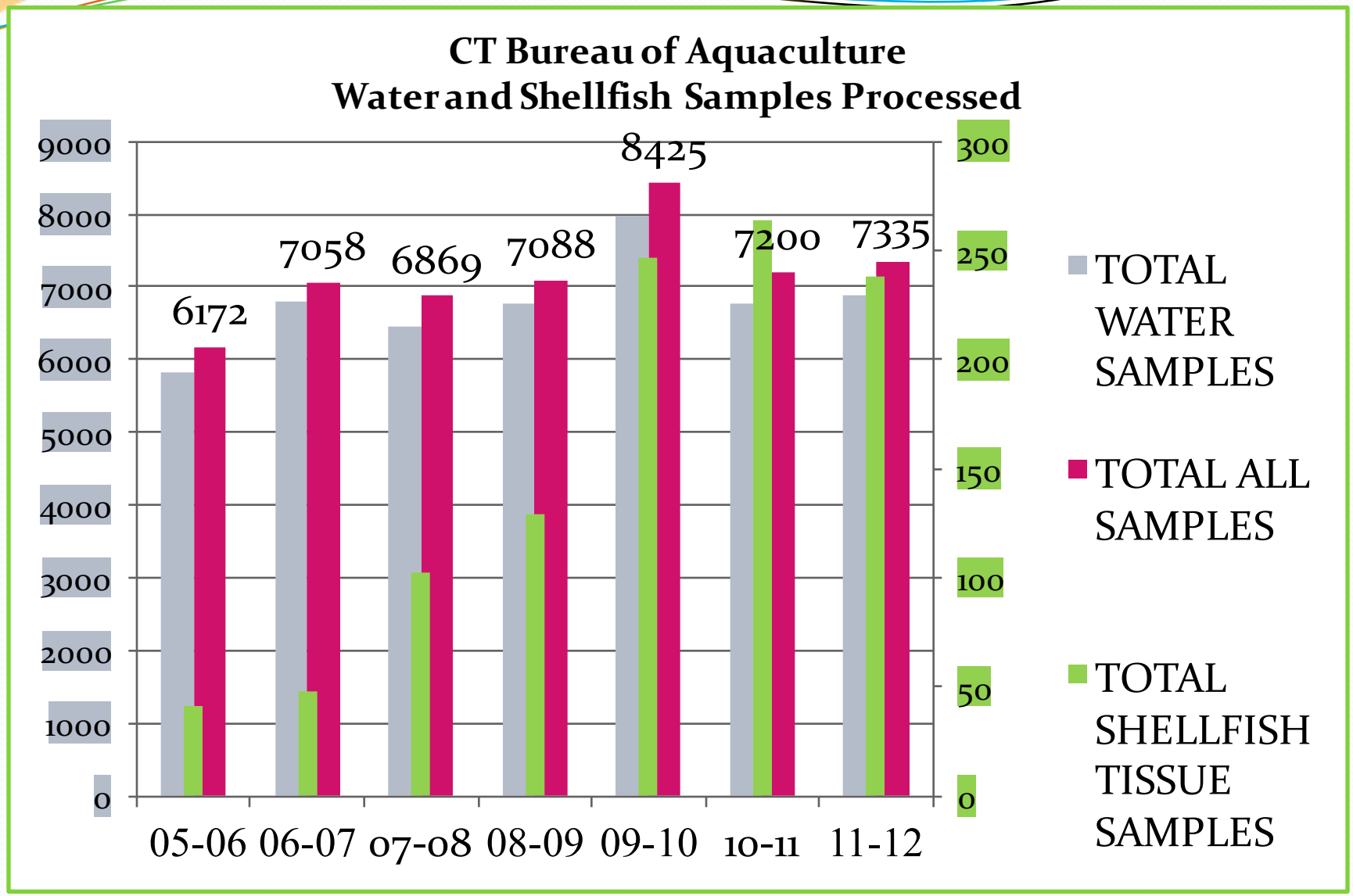

CT Bureau of Aquaculture
Water and Shellfish Samples Processed
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
300
250
200
150
100
50
0
6172
7058
6869
7088
8425
7200
7335
05-06
06-07
07-08
08-09
09-10
10-11
11-12
TOTAL WATER SAMPLES
TOTAL ALL SAMPLES
TOTAL SHELLFISH TISSUE SAMPLES

National Shellfish Sanitation Program Bacteriological Standards

NSSP Fecal Coliform Criteria for an Approved area:

Geometric Mean of membrane filtration (MF) colony forming units (CFU) shall not exceed 14 CFU/100 mL,

AND not more than 10% of samples shall exceed an MF of 31 CFU/100mL

To meet the Approved Criteria, it takes 8 million cubic feet of dilution water to dilute one person's waste in one day

59,850,779 gallons

Volume equal to 12 football fields covered in 10 feet of water

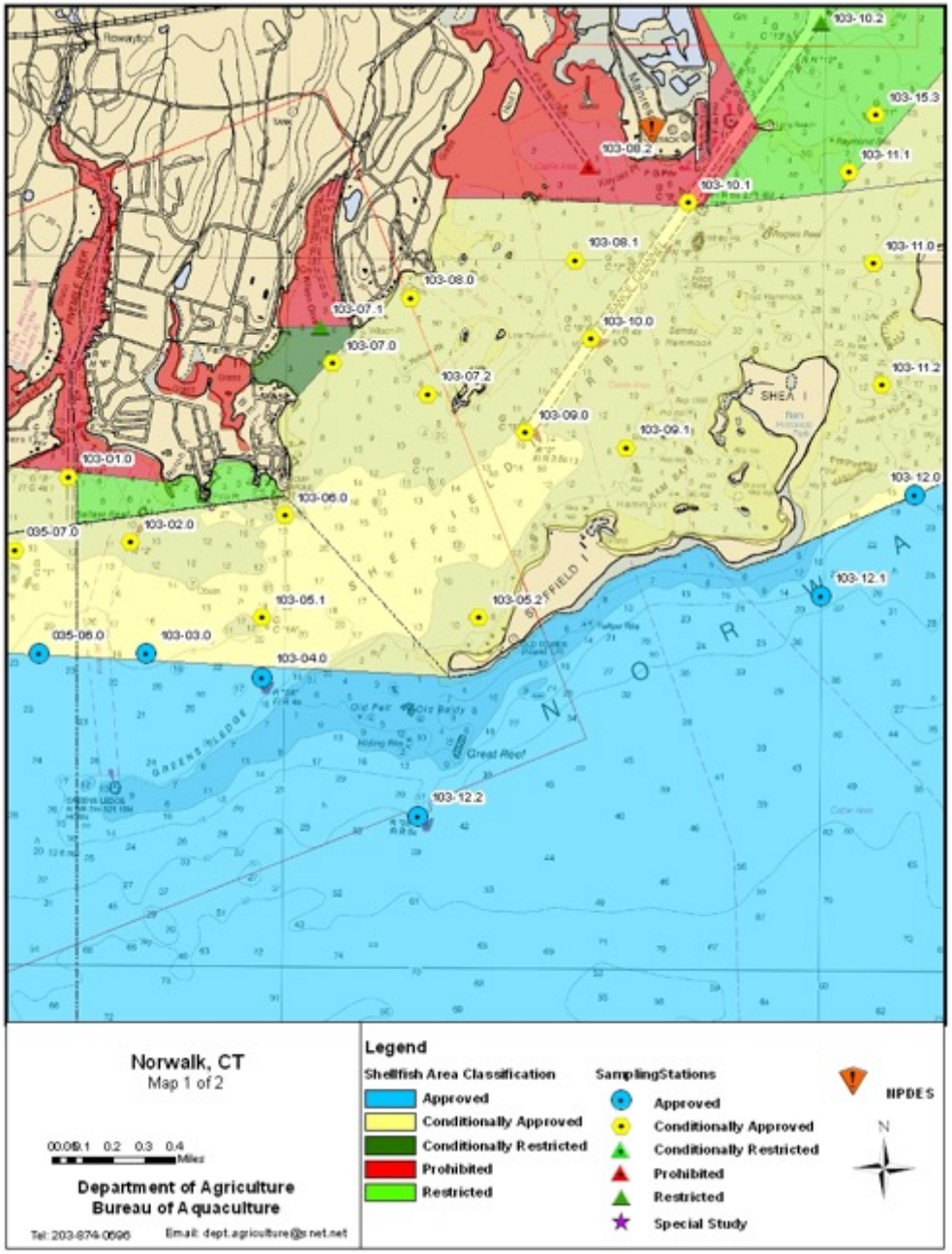
Growing Area Classification

Water sampling & sanitary survey used to determine adequate for shellfish harvesting

Water and tissue samples are tested for fecal coliform bacteria as indicator

Additional sampling for Hazardous Algal Blooms & Paralytic Shellfish Poisoning

There are 800 water quality monitoring stations located throughout the Sound



Inspection and Licensing

~70 Shellstock Shippers
~100 Vessels

NSSP Standardized Shellfish Processing Plant Inspection Checklist

Agency Name:						Date:	
Type of Inspection: ☐ Certification ☐ Pre-operational ☐ Routine ☐ Follow-up ☐ Standardization							
Dealer Name:						Certification Number:	
Dealer Address:							
	Hazard Analysis Critical Control Point (HACCP)						
1.	**HACCP Plan:** Yes ☐ No ☐ Required for Certification						
2.	Plan Elements Identified and Adequate	✓/✗ NA	Code			✓/✗ NA	Code
	(a) Hazards		O	(e) Critical Control Points			K
	(b) Records		O	(f) Monitoring			K
	(c) Critical Limits		K	(g)Verification Procedures			O
	(d) Name, Address, Signed and Dated		O	(h) Corrective Action if identified			K
3.	**HACCP Training:** Yes ☐ No ☐	Code O					
4.	**Plan Implementation**	**Corrective Actions Recorded (K)** **Verification Procedures (K) (Signature)** **Monitoring Procedures (K)** **Records: Accurate/ Maintained (K) Format (O)** **Initialed/Dated (O)** **Firm's Name on record (O)**				✓/✗ NA	Code
	(a)	Receiving					
	(b)	Shellstock Storage					
	(c)	Processing					
	(d)	Shucked Meat Storage					
	(e)	Other Critical Limits					
5.	Approved Source Control Failure						C
6.	Time/Temperature Control Failure						C
7.	Other Critical Control Failure						C
	Sanitation Items				**Citation**	✓/✗	**Code**
8.	Safety of water for processing and ice production				.02A		
9.	Condition and cleanliness of food contact surfaces				.02B		
10.	Prevention of cross-contamination				.02C		
11.	Maintenance of hand-washing, hand sanitizing, and toilet facilities				.02D		
12.	Protection from adulterants				.02E		
13.	Proper labeling, storage, and use of toxic compounds				.02F		
14.	Control of employees with adverse health conditions				.02G		
15.	Exclusion of pests				.02H		
16.	Sanitation Monitoring and Records				X.02		S(K/O)
	Additional Model Ordinance Requirements				**Citation**	✓/✗	**Code**
17.	Plants and Grounds				.03A		
18.	Plumbing and related facilities				.03B		
19.	Utilities				.03C		
20.	Disposal of other waste				.03D		
21.	Equipment condition, cleaning, maintenance, and condition of non-food contact surfaces				.03E		
22.	Shellfish storage and handling				.03F		
23.	Heat shock				.03G		
24.	Supervision				.03H		
25.	Transportation (To include only the person shipping)				IX.05		K
26.	Labeling and Tagging				X.05, .06, .07		S (K/O)
27.	Shipping Documents and Records / Written Recall Procedures				X.08, .03		K
Dealer's Signature:				**Inspector's Signature:**			

Water Collection Procedures

- Procedure for the collection of seawater samples for bacteriological examination used in the classification and monitoring of shellfish growing waters (Revised in 2010)
  - American Public Health Association, American Water Works Association and Water Pollution Control Federation. 1989. Section 9222 B. Standard Fecal Coliform Membrane Filter Procedure. 5d. Alternative single-step direct technique. Standard Methods for the Examination of Water and Wastewater, 17th Edition, APHA/AWWA/WPCF. Washington DC. (Type III).

Water Collection Procedures

EQUIPMENT

- Use the 125 ml single-use sterilized plastic specimen bottles supplied by the DA/BA in Milford or the 125 ml reusable plastic bottles provided by the CT Department of Public Health (DPH) laboratory in Hartford for collecting seawater samples.
  - Use the sterilized 250 ml potable water bottles containing sodium thiosulfate when sampling sewage treatment plant outfalls in shellfish growing waters in order to neutralize any chlorine residual in the effluent.
  - Do not clean, boil or sanitize your own bottles for sample collection, as they cannot be accepted by the testing laboratory.
- Use a water-sampling tool for sample collection. The sampling tool consists of a four (4) foot or longer handle with a clamp or holder at one end to securely hold a sample bottle in a vertical position while minimizing contact with mouth of the bottle and threads. A colored mark on the stick is positioned at 18" above the mouth of the bottle.
- Cooler to hold samples.
- Ice and frozen ice packs in cooler to cool and maintain the **temperature of the samples to 50° F (10° C) or less until refrigerated or delivered to testing laboratory.**
- Tide chart for the area being sampled.
- Nautical chart of area showing locations of sampling stations approved by DA/BA.
- Shellfish seawater analysis laboratory collection forms and account number supplied by DA/BA, DPH Laboratory or private laboratory, respectively.
- Disposable gloves as needed (recommended when working in areas suspected of being contaminated by sewage.

Water Collection Procedures

- Check the rain
- Check the status
- Check the tides
- Call ahead/be in contact with your analyst

Water Collection Procedures

- Sampling technique demonstration
  - Check integrity of the sample bottle
  - Properly label bottle and data sheet
  - Break seal and fold back
  - Place cup FIRMLY in stick
  - Remove cap and hold without touching the interior
  - Take sample at required depth
  - Quick swish
    - Do not resubmerge
  - Recap bottle
  - Remove from stick
  - Place in cooler on ice

Shellfish Tissue Collection Procedures

- Procedure for the Collection of Shellstock Samples for Bacteriological Tissue Examination used in the Classification of Growing Areas
  - Interstate Shellfish Sanitation Conference. 2005. National Shellfish Sanitation Program: Guide for the Control of Molluscan Shellfish. US Department of Health and Human Services Public Health Service Food and Drug Administration.
  - Greenberg, A., Clesceri, L.S., and Eaton, A.D., editors. 1992. Standard methods for the Examination of Water and Wastewater, 18th edition. APHA, Washington, D.C. Recommended Procedures for the Examination of Sea Water and Shellfish, 4th Edition. 1970. APHA, New York, NY.

Shellfish Tissue Collection Procedures

- Heavy-weight plastic bags (food grade) supplied by the DA/BA laboratory to collect shellstock samples, or other clean, waterproof container.
- An appropriate implement (clam rake, etc.) shall be used for collection of the species of interest, for shellstock collected from recreational areas.
- A cooler to hold samples.
- A water bottle to be used as a temperature control for samples. Any small water bottle may be used for the temperature control.
- Ice and frozen ice packs in cooler to cool and maintain the temperature of the samples at 50^{0}F (10^{0}C) or less until samples are delivered to the laboratory.
- Nautical chart or GPS showing location of sampling stations approved by the DA/BA.
- CT DA/BA Shellfish Meats Collection Form (see attached AQ-Lab-02).
- Disposable gloves are recommended for collection of samples from areas suspected of being polluted with sewage or close to water pollution control facilities.

Shellfish Tissue Collection Procedures

- The shellstock monitoring station identification number must be written on the bag using a waterproof, permanent marker. The monitoring station number will consist of the Town's state tax number, followed by the DA/BA assigned station number or name of lot or growing area.
- A representative sample of shellstock from the assigned station is collected. 15 individuals of the same species are taken in order to obtain a representative sample. With most species, this allows for 200 g of combined liquor and meats. At least 200 g of shellfish tissue are used for analysis. Select the shellstock to be examined and place in the bag. Shellstock should be free of excess mud and silt. Clean in original harvest area if necessary. Close top of bag. If individuals are smaller, more animals are needed to meet the necessary weight requirements for examination.
- Place sample in cooler. The sample must be kept above freezing and below 50^{0}F (10^{0}C) until examined. The shellstock must not come into direct contact with ice or melted ice water, please use sealed plastic bag and keep sample upright.
- A temperature control should be collected at the same time, or prior to, meat collection. Any small water bottle may be used for the temperature control. The temperature of the water will be taken when the sample arrives in the laboratory. Any samples that are collected without a temperature control will not be accepted. If temperature control is above 50^{0}F (10^{0}C) when the sample arrives in the lab, the sample will not be examined.
- Complete a Shellfish Meats Collection Form (AQ-Lab-02). The following information is needed:
  - Town, date collected, time collected, collector
  - Sample location (station number assigned by DA/BA or name of lot/growing area)
  - Sample Type (species)
  - Date harvested, harvester (for samples collected by a harvest vessel)
  - Shellfish relayed from (original harvest area) and date relayed (if applicable)
  - Latitude/Longitude coordinates should be recorded under comments if available.
- Samples of shellstock should be examined within 6 hours after collection, and in no case more than 24 hours after collection.

What do you mean when you say the lab is overloaded?

- Media preparation
- Processing time
- Sterilization/cleanup
- Commercial (data and reopening samples) are the priority
- Reopenings
  - How Many? Depends on the rain the area and 'the count'

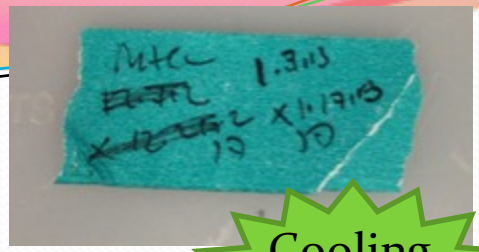
Town	CA Open Samples		CA Open APC Samples	A Open APC Samples	RR & P APC Samples	CRR Samples
Greenwich	CA A	13	6	7	7	6
	CA B(s)	9	5			
	CA G+H	13	5			
Stamford	Westcott Cove	3	1	6	5	4
	Cove Harbor	3	1			
Darien	1.5"	13	5	6	5	7
	Long Neck Point	12	5			
	Cookes(s)	5	1			
	Zieglers(s)	8	5			
Norwalk	1.5"	13	6	5	5	
	Cookes(s)	5	1			
	Wilson Cove(s)	8	6			
	CA A(s)	8	3			
	Sprite Is.(s)	8	6			
Westport	1.5"	13	5	5	5	7
Fairfield	CA A	8	4		5	7
	CA B	12	5			
Bridgeport					5	
Stratford	1.0"	6	2		5	
Milford	0.5"	5	3	5	5	7
West Haven	CA 1.5"	13	7		5	
New Haven	CA 1.5"	13	7		5	
East Haven	CA 1.5"	13	7		5	

Minimum Sampling Requirements

	Monthly Open	APC
Approved	0	5 (open)
Conditionally Approved	1/month while the area is open	5 (open or closed)
Restricted Relay	0	5
Conditionally Restricted Relay	0	5 (3 Open)
Prohibited	0	5

Water Samples

- 1 Batch = 120 Samples + Quality Control
  - ≥4 hours prep time
    - Expiration = 14 days
  - Holding time 30 hours
  - ≈2 hours process (2 people)
  - 2 hour water bath (stop time 3pm)
  - 24 hours incubation
  - 1-2 cleanup/autoclave



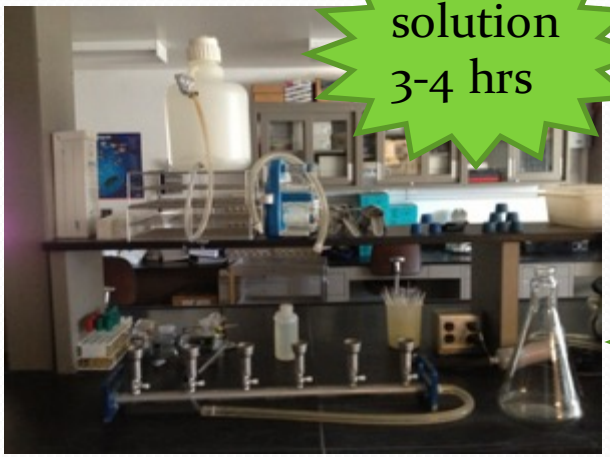
Cooling 60 mins

Pouring 30 mins

Autoclave 45-60 mins

Media prep time 30 mins

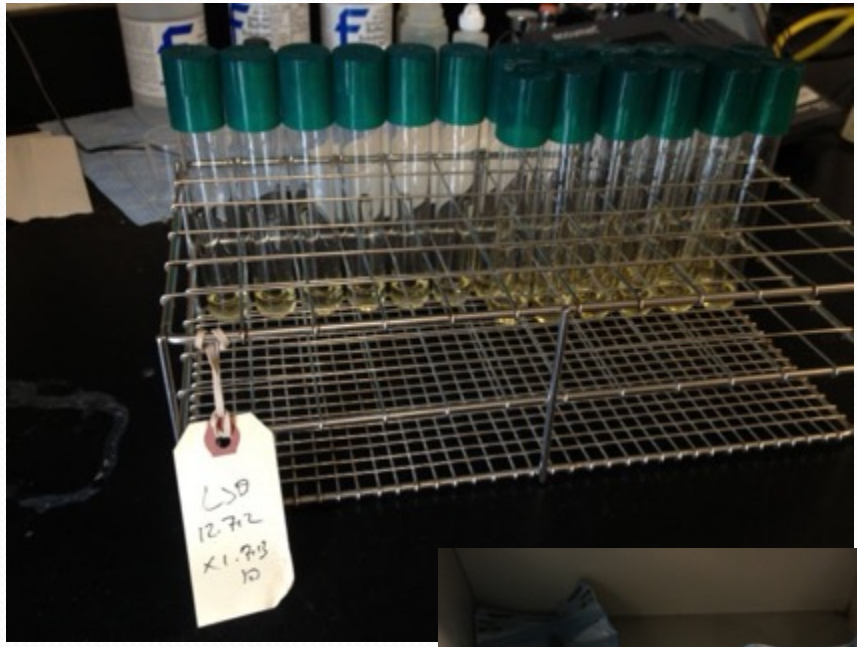
Washing solution 3-4 hrs



Autoclave 45-60 mins

Tissue Samples

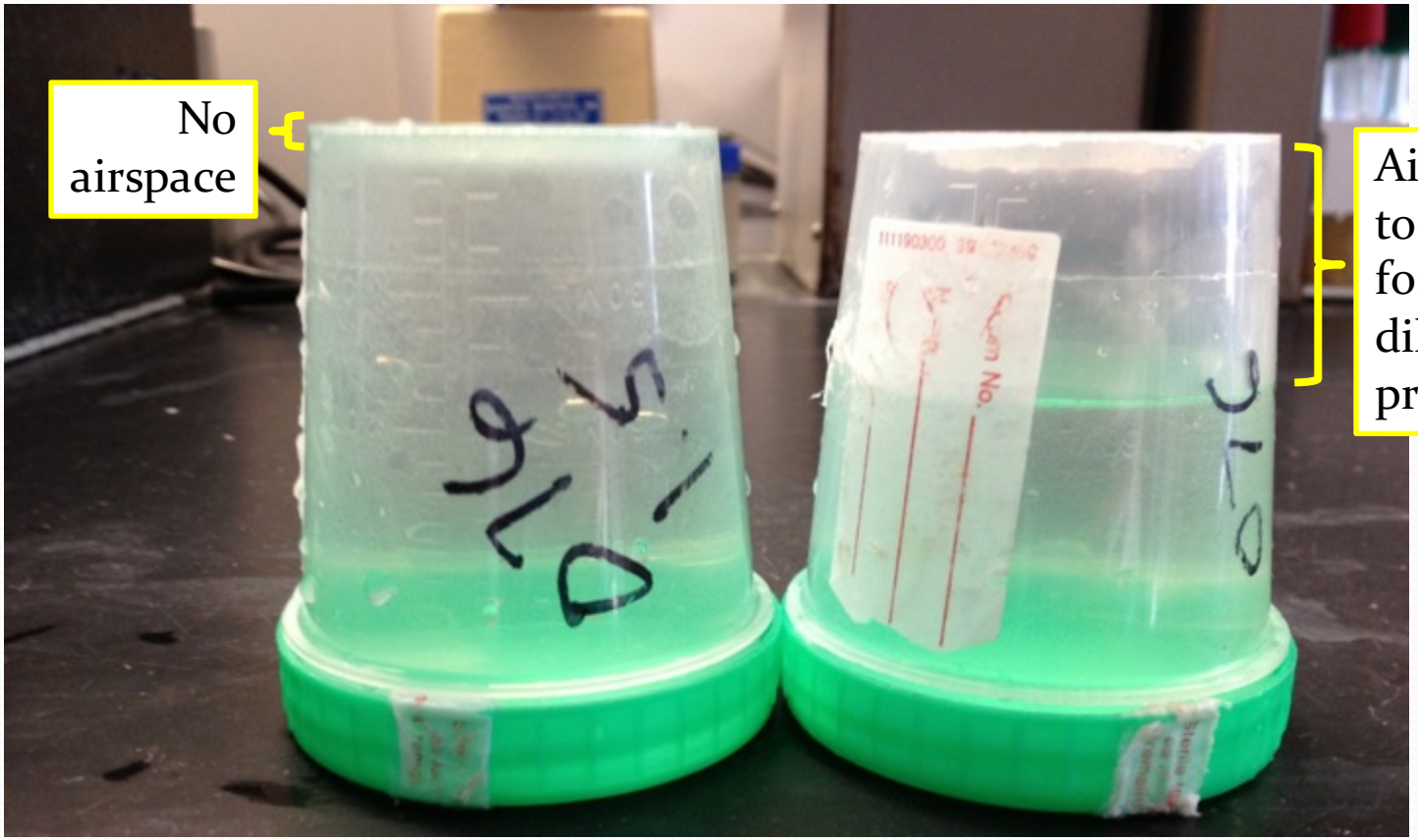
- 1 Batch = 4 tissue Samples
  - Expiration = 1 month
    - 8 Utensils (autoclaved)
    - ≈4 hours Prep time
    - Holding time 24 Hours
    - 48 hour test (2 24 hr portions)
    - Wash tubes



Take Home message

- Call Ahead and communicate with your analyst

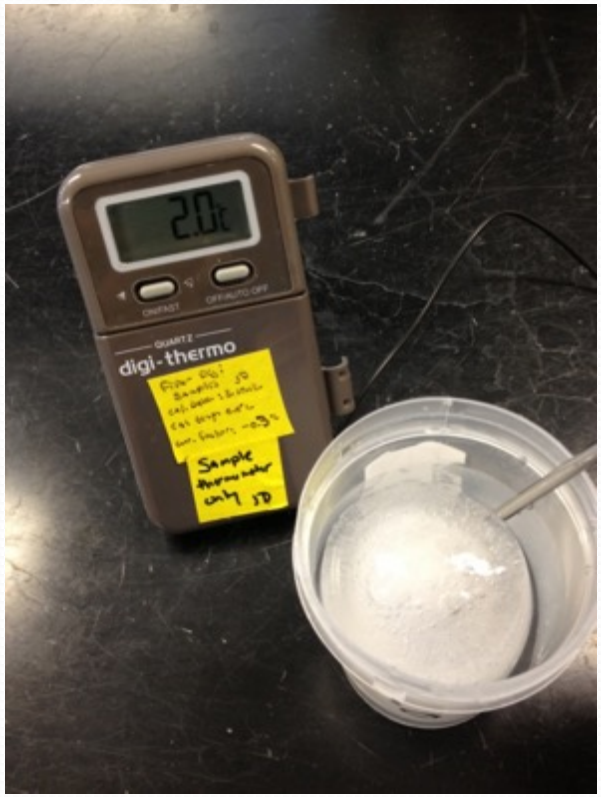
Common mishaps and tips to avoid them



Adequate airspace is the width of the threads on the sample bottle or approximately ½ inch

Common mishaps and tips to avoid them

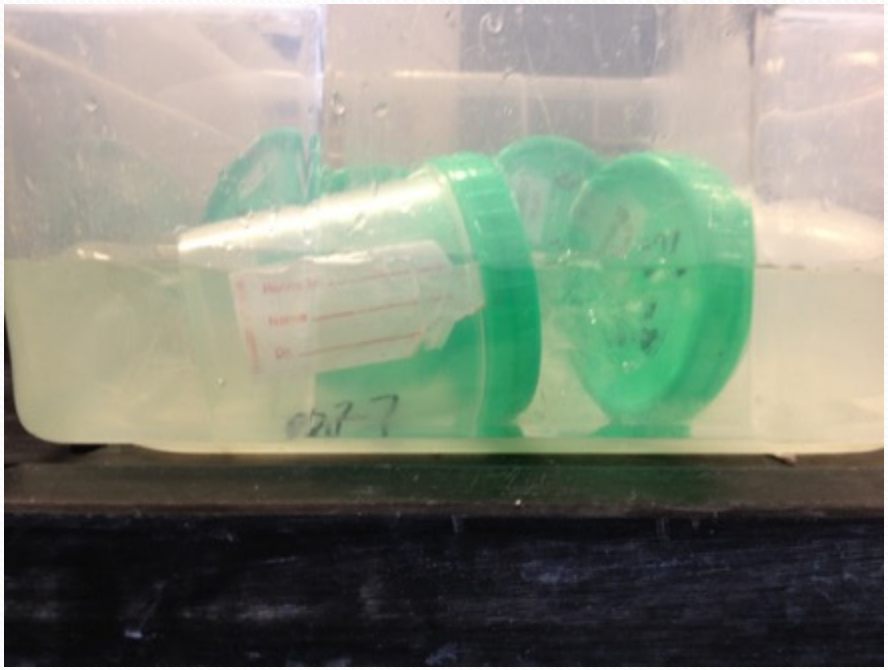
TOO HOT!!!



TOO COLD!!!

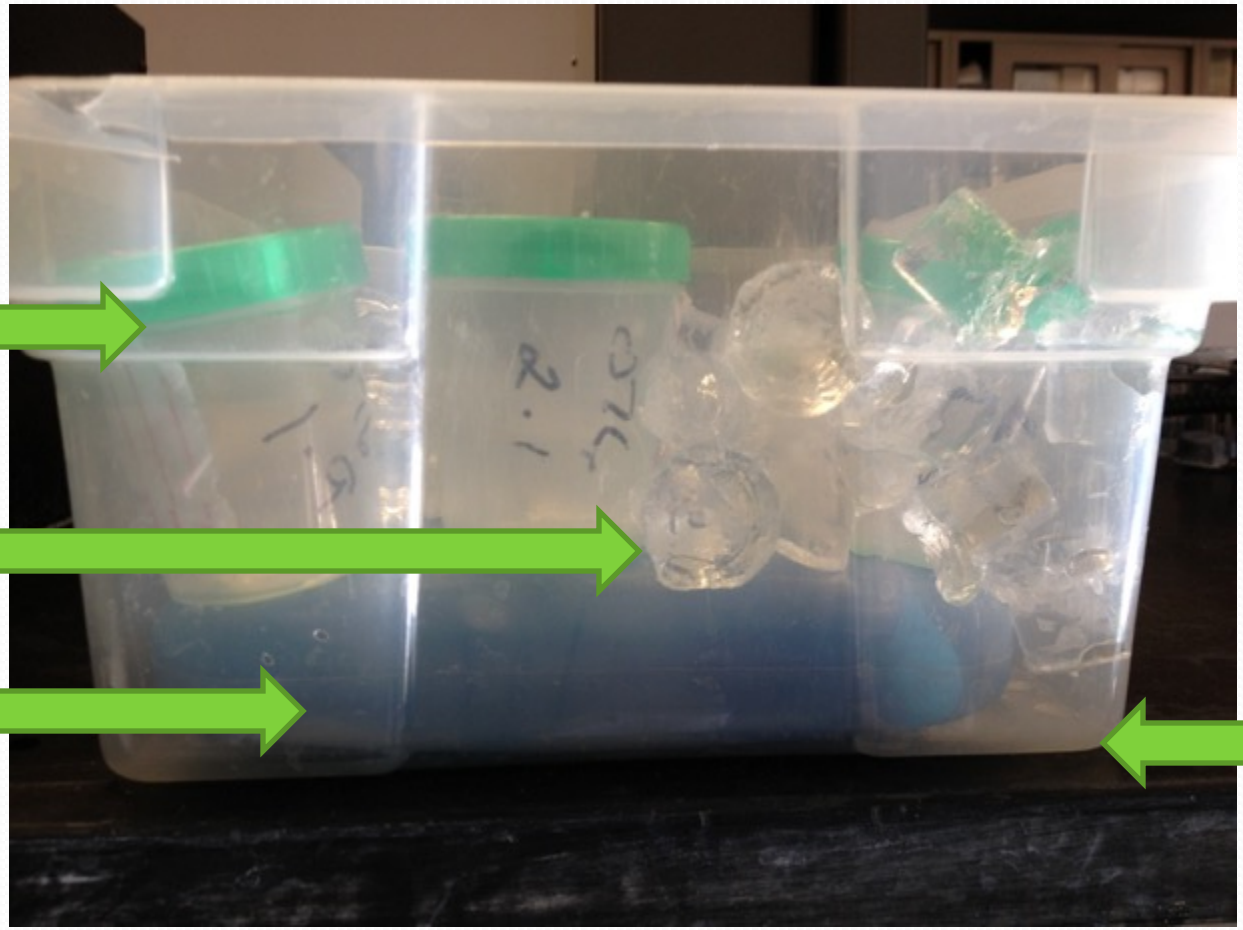
- Goldilocks Syndrome- We want to keep bacteria from growing and/or dying

Common mishaps and tips to avoid them



Bottles tipped over in water or water level higher than threads

Common mishaps and tips to avoid them



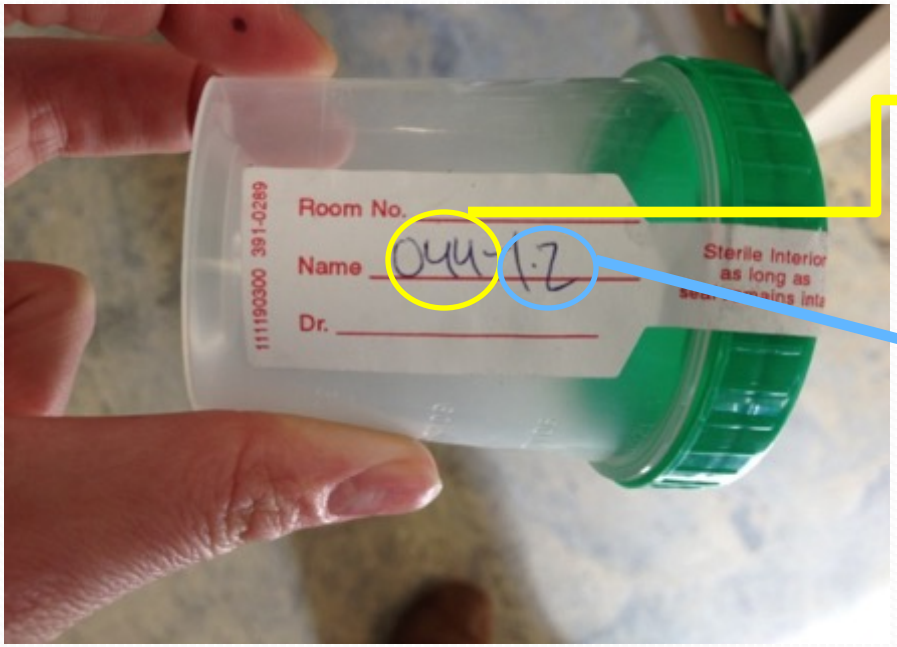
Bottles Standing upright

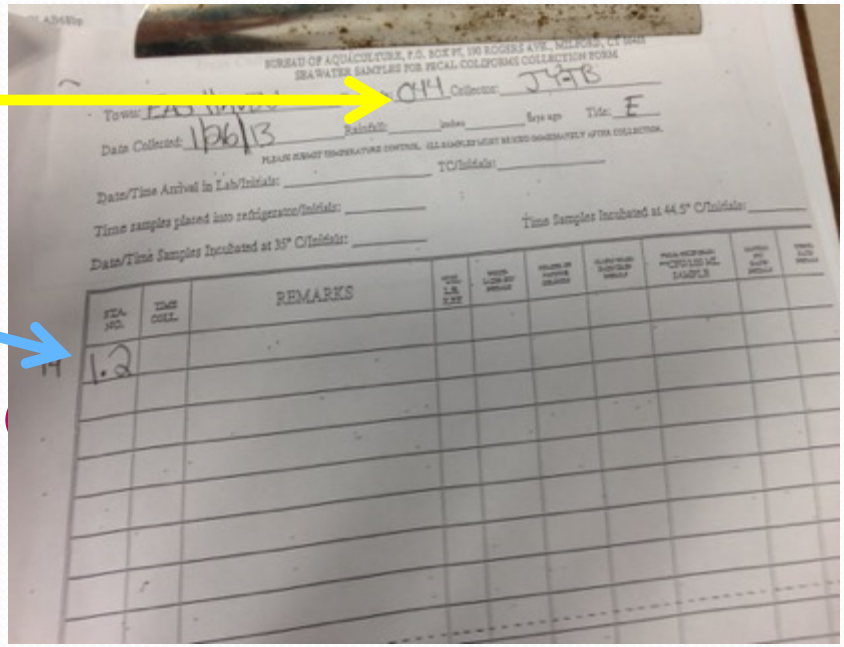
Ice surrounding samples

Ice Pack

Hole in bottom of cooler

Common mishaps and tips to avoid them





Questions?

Jenifer Yeadon
State of CT
Department of Agriculture/Bureau of Aquaculture