Shellfish Sanitation and Birds

Bob Rheault
Executive Director
East Coast Shellfish Growers Association
bob@ECSGA.org

Notes from 2 sessions held at the National Shellfisheries Association Annual meetings in 2023 and 2024 are available on the ECSGA website: ECSGA.org

Bird Interactions with Shellfish Gear

Our bird interaction resources are listed below as links to callouts for pages, videos or documents.

Each callout has a brief description of the resource and a title or photo that links to the resource.

Shellfish Sanitation and Birds (Power Point video)

Seasonal Patterns of Distribution and Abundance of Waterbirds in Relation to Oyster Aquaculture in Coastal Rhode Island (pdf of Power Point)

Birds and Shellfish Sanitation session of 115th NSA meeting (notes on 11 presentations)

Deterring Coastal birds from Roosting on Oyster Culture gear in Eastern New Brunswick, Canada (article in Aquacultural Engineering)

Birds on Floating Culture, Oh My! (pdf of Power Point from 115th NSA meeting

Deterring Birds (SEMAC pdf of Power Point)

Are We Overestimating Risk of Enteric Pathogen Spillover From Wild Birds To Humans? (highlighted pdf from Biological Reviews)

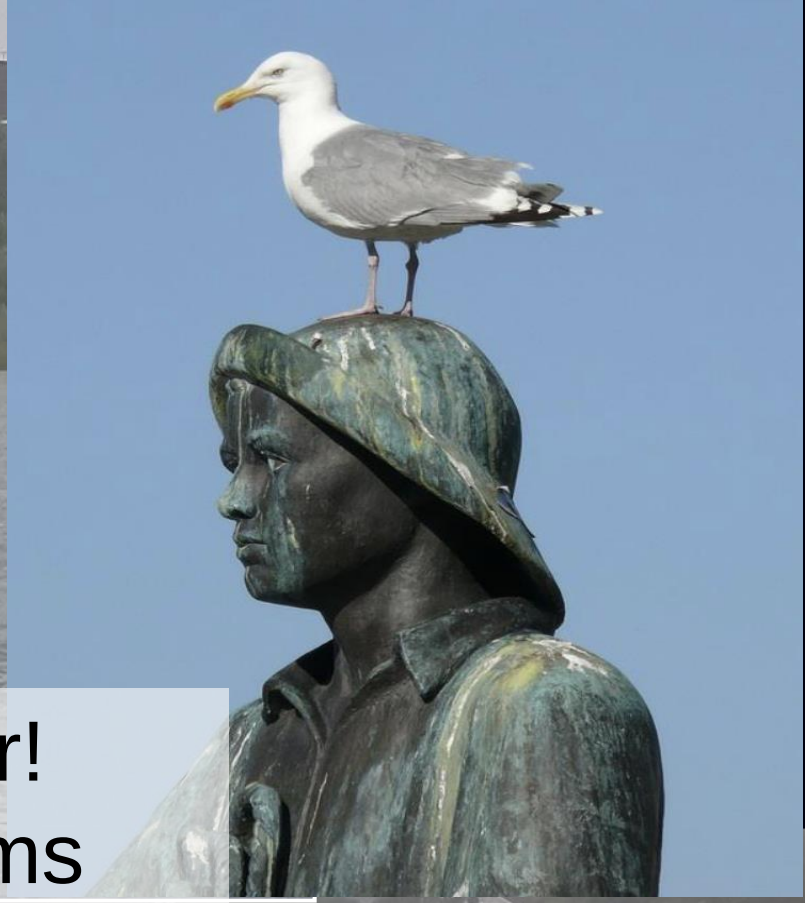
Genetic Markers for Rapid PCR-Based Identification of Gull, Canada Goose, Duck, and Chicken Fecal Contamination in Water

Campylobacter jejuni in Black-Headed Gulls: Prevalence, Genotypes, and Influence on C. jejuni Epidemiology (highlighted pdf from 2002 Journal of Clinical Microbiology)

EPA Technical Support Materials: Developing Alternative Recreational Criteria for Waters Contaminated by Predominantly Non-Human Fecal Sources (highlighted pdf)

Fact sheet on Potential for Food-borne Illness Caused by Bird Waste (pdf)

Birds on Floating Gear Could Present Problems (ECSGA newsletter article pdf)



~2006 Floating gear!
Solves some problems
Creates some new ones…

2015 Shellfish Meat and Seawater Results
3 Oyster Culture Sites, Great South Bay

Date	Site	SST (°C)	Oyster FC MPN/100g	Seawater FC MPN/100mL
8/24/15	#1	26.6	5400	210
8/24/15	#1	26.6	>16,000	23
8/24/15	#2	26.6	2400	9.1
8/24/15	#2	26.7	700	9.1
8/24/15	#3	26.3	2400	93

All shellfish samples contained excessive bacteria; FC > 230 MPN/100g
3 of 5 Seawater Samples – FC exceeds 14 MPN/100 mL
Emergency closure of lease area effective 8/27/2015
*First closures of floating oyster culture sites in New York

Illness outbreak in RI in 2021

- Growing area was shallow with low tidal amplitude ~1-2’
- Gower sank cages, birds dispersed
- Oysters tested clean after 18 day (probably less)
- Closure for two more weeks following clean tests
- FC levels were non-detect 75’ from the farm!

Two more in 2024

- One in Maine end of June
  - Six ill, floating bags in Freeport
- One in Cape Cod

4 diners at one table on July 4

- Probably chicken cross contamination in kitchen?
- 16,000 oysters from that harvest area that week …
- Can’t rule out oysters.
- Repeated testing continued to find Campy, different species and strains and farms in the area.
- Pathogenic???

2019 rewrite of the aquaculture chapter of the NSSP

"Each aquaculture site that the Authority determines may attract sufficient birds and/or mammals that their waste presents a human health risk shall have a written operational plan."

2019 rewrite of the Aquaculture chapter of the NSSP

OP Shall Include:

A description of the mitigation or deterrent measures to minimize the potential pollution impact of birds and/or mammals….

Following the Illnesses….

- Increased attention from the FDA
- Increased scrutiny from state authorities
- Wide array of responses

Without guidance…

- One state threatened to ban floating gear altogether.
- Many threatened with permit revocation- some leases closed.
- Two states mandate 3 weeks submergence.
- One state only permits floating gear in restricted waters and requires relay.
- Many states view the risk as small.

2023 Aquaculture Guidance

- Authority required to evaluate risk
- Consider flushing and hydrodynamics
- Consider bird seasonality
- Consider nursery gear
- Consider re-submergence requirements

Guano Can impact Water Quality

Photos courtesy of NYDEC

- WQ status determined by measuring Coliforms
- Indicator bacteria assoc. with warm blooded animals
- 30 samples over 3yrs
- If the arithmatic mean exceeds limits then the harvest area must **close!**

Coliforms

- Correlations between coliforms and pathogens established for wastewater
- Human pathogen prevalence in wildlife is rare
- Correlation in wildlife feces unknown
- Non-zero risk

Regulatory Considerations

- If FC numbers exceed WQ standards - growing area closures are required.
- Food Code dictates it is illegal to have filth (waste of fecal material) in food.
- FDA NSSP recognizes that a small amount of fecal coliform in shellfish is permissible.
- We lack the tools to properly evaluate risk.

Not to mention – it's a bad look!

URI Purge Study

- Three clinical Campylobacter strains
- Introduced to oysters with a starting dose of 7 E7 cfu/g.
- Purged to a non-detect in 5-9 days.

- Needs repetition!
- Expensive, challenging – and complicated work with a highly pathogenic strain!

Deterrents can be tricky

- Don’t want to harm or disturb protected resources or critical habitat.
- Birds tend to acclimate to certain tactics.
- Probably need multiple approaches and rotational application.
- Many approaches interfere with maintenance or worker safety or create marine debris.

Scare Kites

Expensive
Can get shredded
Need to be moved
Not always effective
Sometimes prohibited
Not great in calm winds

From: Josh Rietsma SEMAC minigrant

Pole and Line – effective but, not durable marine debris

From: Josh Rietsma SEMAC minigrant

Zip Tie Ticklers

- Mixed results
- Need lots of them
- Terns sit between
- Some sag
- Collect fouling debris

From: Josh Rietsma SEMAC minigrant

Perching deterrents

- Seem to keep birds off to varying degrees but handling gear, longevity, and cost are issues
- Stainless spikes seemed to work well

From Josh Reitsma, SEMAC mini-grant

From Jeffrey Canha

From Ketcham Supply
New Bedford

Effective Deterrent for Oyster Gro Type Gear

Perching deterrent for floating bags needed!

From: Josh Rietsma SEMAC minigrant

Others in Development

- Green lasers (don't harm the birds! – just startle them)
  - Effective on land – expensive
- Sprinklers
- Drones
- Farm activity
- Animatronic coyote on float
- Distress calls

Foodborne Campy Oysters

cdc.gov/ncezid/dfwed/beam-dashboard.html

BEAM Dashboard
National Outbreak Reporting System (NORS)

Quick Stats - Overall (1971-2023)

Outbreaks	Illnesses	Hospitalizations	Deaths
66,708	2,218,218	48,006	2,491

Filter By:
Primary Mode of Transmission

Reset Filt

Foodborne	Waterborne	Animal Contact
Environmental	Person to Person	Indeterminate/Unknown

Year: 2009 – 2023

Single-state vs. Multistate: All

State: All

Charts Display: Outbreaks

Etiology: Campylobacter

Setting: All

Food / Ingredient: Search / Multiple selecti...

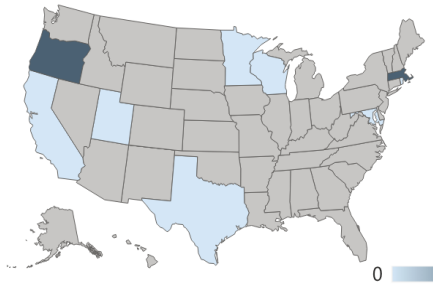
IFSAC Category: All

Animal Type: All

WaterExposure: All

Water Type: All

Outbreaks per State

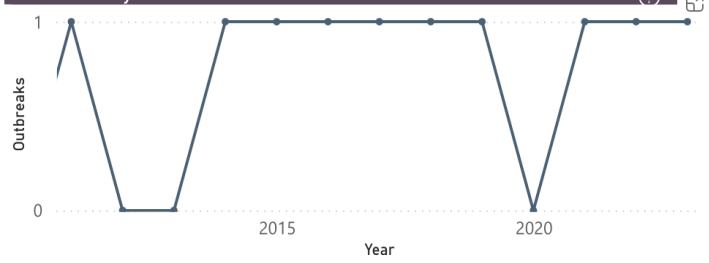


Quick Stats - Current Filters

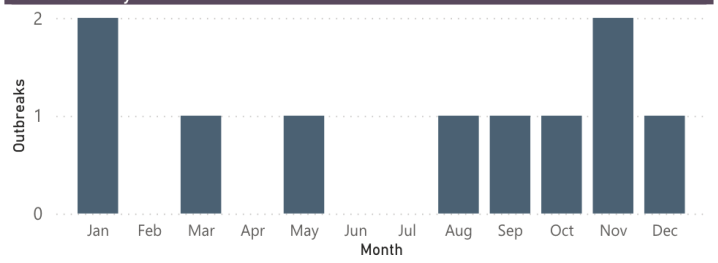
Outbreaks	Illnesses
10	63
Hospitalizations	**Deaths**
7	0

Learn more about available data

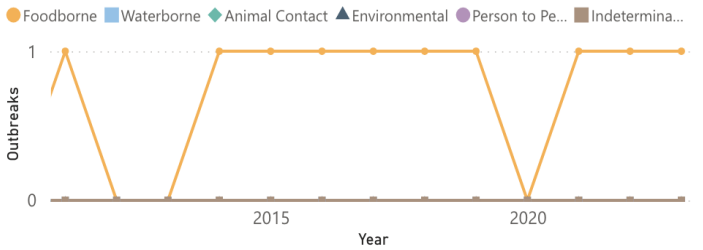
Outbreaks by Year



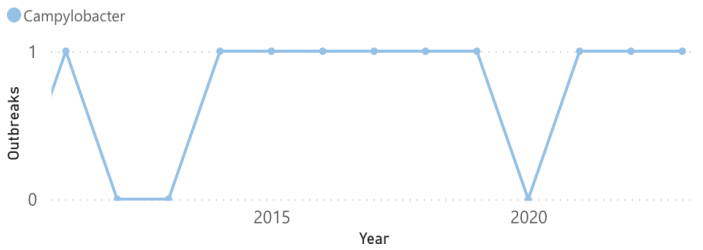
Outbreaks by Month



Outbreaks by Year and Primary Mode of Transmission



Outbreaks by Year and Etiology (The top 5 selections are displayed.)



Annual Report | Quarterly Report | NORS View | Vibriosis Surveillance | Outbreak Serotypes of Concern | Data Behind Outbreak... | Food Safety Funding

98%

Foodborne Vibrio Oysters

cdc.gov/ncezid/dfwed/beam-dashboard.html

BEAM Dashboard
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Single-state vs. Multistate: All

State: All

Charts Display: Outbreaks

Etiology: Vibrio

Setting: All

Food / Ingredient: Search; Multiple selecti...

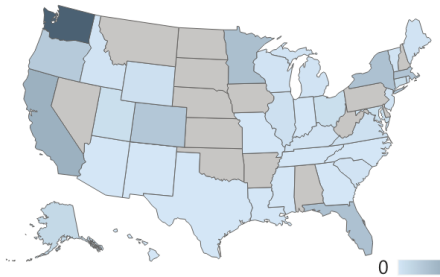
IFSAC Category: All

Animal Type: All

WaterExposure: All

Water Type: All

Outbreaks per State

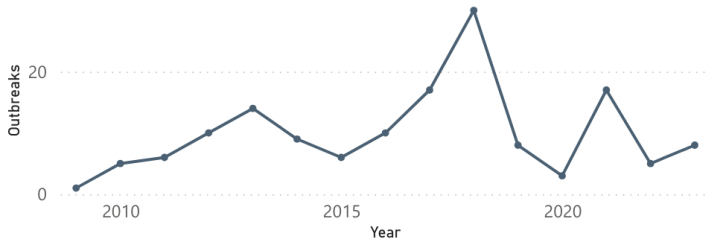


Quick Stats - Current Filters

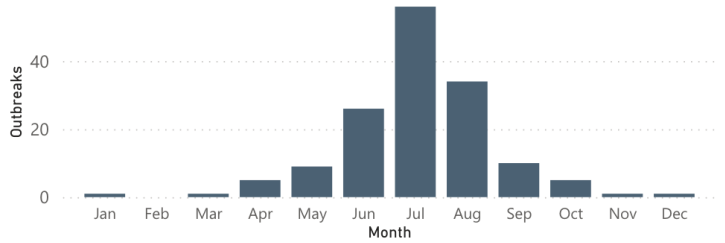
Outbreaks	Illnesses	Hospitalizations	Deaths
149	781	50	3

Learn more about available data

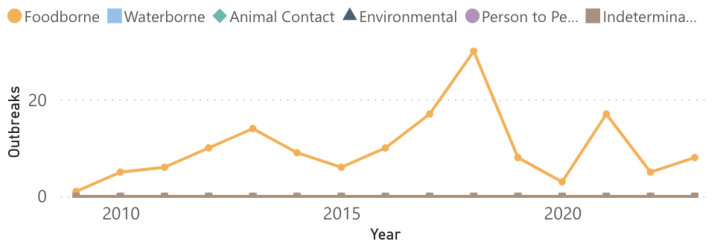
Outbreaks by Year



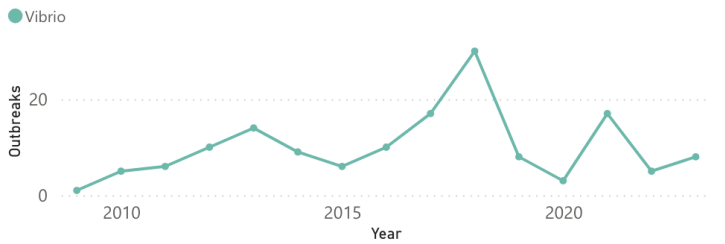
Outbreaks by Month



Outbreaks by Year and Primary Mode of Transmission



Outbreaks by Year and Etiology (The top 5 selections are displayed.)



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Foodborne Norovirus Oysters

cdc.gov/ncezid/dfwed/beam-dashboard.html

New Chrome a

BEAM Dashboard
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Filter By:

Primary Mode of Transmission

Foodborne	Waterborne	Animal Contact
Environmental	Person to Person	Indeterminate/Unknown

Reset Filters

Year: 2009 – 2023

Single-state vs. Multistate: All

State: All

Etiology: Norovirus

Setting: All

Food / Ingredient: Search

Search
- Oyster
- Oyster Shooters
- oysters
- Oysters (raw), re...
- oysters, baked
- oysters, fried
- oysters, raw
- oysters, steamed
- paella
- paella marinera

Multiple selecti...

IFSAC Category: All

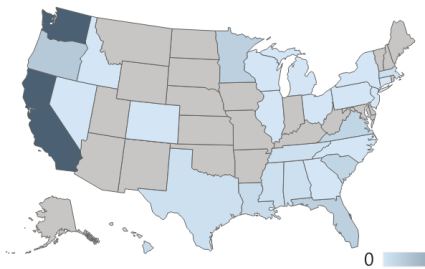
Animal Type: All

WaterExposure: All

Water Type: All

Charts Display: Outbreaks

Outbreaks per State

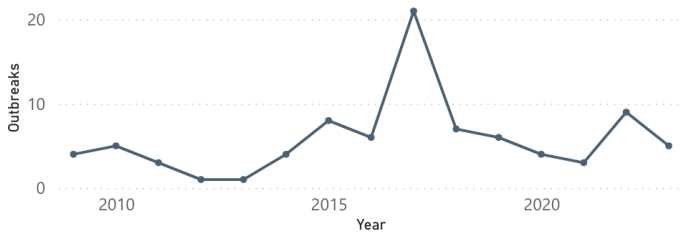


Quick Stats - Current Filters

Outbreaks	Illnesses	Hospitalizations	Deaths
87	1,502	13	0

Learn more about available data

Outbreaks by Year



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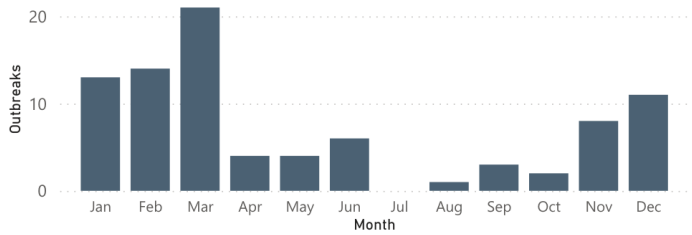
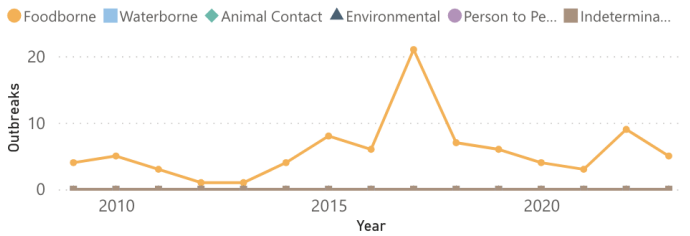


Outbreaks by Year and Primary Mode of Transmission



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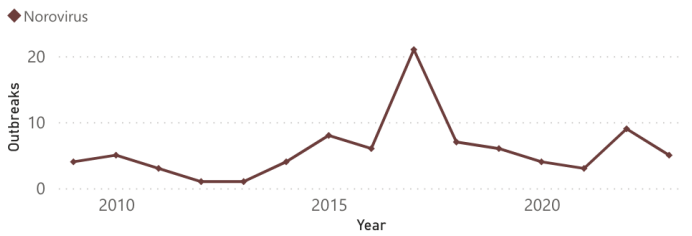

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Campylobacter

- 1.5 million illnesses a year
- 29 Species – most not human pathogens
- over 90% of illnesses are from C. jeujuni
- 3,557 isolates of C. jeujuni - but only 28 have been associated with outbreaks -
- less than one percent!
- **Don’t go looking for Campylobacter!**

Oyster-Related Outbreaks
2009-2023

Outbreaks

- Campy 10 oyster-related w/ 63 illnesses
- Vibrio 149 oyster related w/ 781 illnesses
- Norovirus 86 oys. related w/ 1456 illnesses

Non-outbreak

- ~2,600 culture confirmed foodborne Vp illnesses per year – mostly seafood

How much effort and cost is justified?

- Outbreaks are rare -
- What is the prevalence of human pathogens in wild birds? It appears that outbreak related Campy isolates are ~ 0.7% of all serotypes
- FDA has a zero tolerance policy for Campy!
- Don’t go sampling for something you don’t want to find!
- Chances are good you will find something, and even better that it is benign.

Biological Reviews / Volume 95, Issue 3 / p. 652-679

Original Article | Open Access

Are we overestimating risk of enteric pathogen spillover from wild birds to humans?

Olivia M. Smith, William E. Snyder, Jeb P. Owen

First published: 31 January 2020
https://doi.org/10.1111/brv.12581

- We conclude that current data do not provide sufficient information to determine the likelihood of enteric pathogen spillover from wild birds to humans and thus preclude management solutions. The primary focus in the literature on pathogen prevalence likely overestimates the probability of enteric pathogen spillover from wild birds to humans because a pathogen must survive long enough at an infectious dose and be a strain that is able to colonize humans to cause infection.

Studies show:

"*Campylobacter* spp. Are highly host adapted… (Atterby et al 2018).

Only 1 of 109 *Campylobacter* isolates from wild ducks was a sequence type associated with human disease… (Colles et al. 2011).

Wild bird isolates accounted for only 0.23% of human *Campylobacter* infections (Seguino et al (2018).

Studies show:

"Contamination from …birds negatively impacts water quality…. and can contaminate shellfish…

Although pathogens occur in bird feces, exposure to bird feces is considered less harmful that exposure to other sources of fecal contamination, especially that of humans. (Green et al. 2021)

Risk

- We believe that the risk is probably low (simply because illness outbreaks are rare.)
- We acknowledge that the risk is non-zero.
- What is the acceptable level of risk? (Appears to be much lower than for Norovirus or Vibrio)
- What controls are justified and under what conditions? How many birds are too many?
- Are similar controls being mandated for the wild harvest when birds are present in growing areas?

ISSC Actions – April 2024 ExCom meeting

ISSC Formed Aquatic Bird Risk Assessment Committee to:

1. Review literature.
2. Look for seasonal and spatial data on birds and pathogens.
3. Evaluate methodologies for Quantatative Risk Assessment.
4. Preform a preliminary risk assessment.
5. Evaluate purge rates for pathogens.
6. Hold a workshop on findings

United States Environmental Protection Agency

Office of Water
EPA 822-R-24-003
April 2024

Technical Support Materials: Developing Alternative Recreational Criteria for Waters Contaminated by Predominantly Non-Human Fecal Sources

EPA Technical Support Materials April 2024

- EPA's Office of Water, Office of Science and Technology, Health and Ecological Criteria Division
- Addresses classification of bathing waters that have been impacted by non-human sources of fecal material.
- Comprehensive literature review
- Strong recommendations on how to evaluate risk,
- Describes how to conduct a Quantitative Risk Assessment when epidemiological studies won't work because there is not enough data

EPA Findings:

- The correlation between fecal indicator bacteria and human pathogens in gull feces is two orders of magnitude less than for seawater impacted by human waste!

- It will take substantial resources to develop the data needed to convince regulators to change the FIB standards for growing waters, but this should allow them to think twice before closing waters.

Questions?

www.ECSGA.org

bob@ECSGA.org